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VOLUME IV.

WITH THIRTY-FIVE PLATES.

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EDITORIAL NOTE.

This and the previous three volumes have been published by the Agricultural Department of the Cape Government, but owing to the present financial depression in the Colony and the necessity for curtailing expenditure the further collection of material and publishing of results have for a time been suspended by the Department.

The continuation of the work, however, has been rendered possible by the assistance of the South African Philosophical Society, who have undertaken to print Volume V. of the Marine Investigations as Volume XVII. of their Transactions, at the same time granting an adequate supply of extra copies so that the continuity of the series of the Marine Investigations may not be interrupted.

J. D. F. GILCHRIST.

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THE CAPE GOVERNMENT TRAWLER IN TABLE BAY

MOLLUSCA OF SOUTH AFRICA.

(PELECYPODA.)

BY

G. B. SOWERBY, F.L.S.

Among a large quantity of *Pelecypoda* submitted to me by Dr. J. D. F. Gilchrist, Government Biologist of the Cape Colony, are some species of special interest. Thirty-three I am describing as new to science, and noting a few others which have not hitherto been recorded as South African. Among the former I may specially mention 4 new species of *Poromya*, Forbes, a very rare and remarkable genus, of which no species has hitherto been recorded from South African waters; 4 new species of of *Cuspidaria*, Nardo (*Neæra*, Gray), of which genus only one species (*C capensis*, Smith) had been noted as South African, five new species of *Crassatella*, Lamarck, and three of *Nuculana*, Link (*Leda*, Schumacher).

Among the species already described, but not as South African, the most interesting, is a fine specimen *Cryptodon investigatoris*, Smith, obtained in deep water off Cape Point.

Fam. **Pectinidæ.**

*Chlamys Gilchristi, n. sp. (Plate VI., fig. 6). Shell nearly orbicular, equivalve, thin, semitransparent, compressed, pale pinkish yellow; auricles unequal, the posterior the smallest. Left valve very slightly convex, rayed with about nine very slightly raised ribs, about 70 slightly imbricated riblets or liræ, and numerous very close rough intervening striæ; anterior auricle rather broad, rectangular, with six narrow rather prominent ridges, crossed by foliated lamellæ, the interstices being peculiarly corrugated; posterior auricle smaller, more

* *Chlamys*, Bolten, 1798 (Pecten, Auctorum).

numerously and less prominently ridged, the decussating lamellæ imbricated, and the corrugation more definite and oblique; umbones acute. Right valve rather more convex, radiating ribs broader and flatter, and with concentric imbricated lamellæ becoming somewhat prominent towards the margin; anterior auricle strongly imbricated, the lamellæ being irregularly raised on the upper margin: posterior auricle with ridges closely armed with nodules or short blunt spines. Interior of the valves suffused with golden orange colour. Ligamentary pit small, triangular.

Height, 35; width, 35; depth, 8 millim.

Hab.:—Vasco da Gama, False Bay, N. 71° E, 18½ miles; depth, 230 fathoms; bottom, stones.

Of this beautiful species only one specimen has come to hand. The shell is of a very light, semitransparent substance, delicately tinted, having somewhat the general aspect of the *C. Septemradiatus* of the northern seas, but more numerously ribbed. The entire surface is roughened by close-set, imbricated ridges and fine striæ, and the auricles are elaborately sculptured, particularly the posterior of the left valve, which, in addition to the imbricated cross bars, shows a peculiar arrangement of oblique granose striæ.

Chlamys Fultoni, n. sp. (Plate VI., fig. 5). Shell nearly orbicular, rather thin, compressed, equivalve, dull purplish-brown, irregularly interrupted with white markings. Auricles rather large, slightly unequal, posterior rectangular, anterior slightly laterally produced above and sinuous below. Valves furnished with 17 rounded, rather elevated equidistant ribs, the interstices being about the same width as the ribs, and regularly concave, without radiating striæ: both ribs and interstices are traversed by thin lamellæ, which are squamosely raised on the ribs, particularly on the lateral ones. The right valve is somewhat smoother and lighter in colour, but otherwise presents the same character as the left. The anterior auricle of the right valve is strongly laminated, otherwise they are regularly costate.

Height, 33; width, 34; depth, 11 millim.

Hab.:—Amatikulu, Conical Hill, N.W., 7½ miles; depth, 26 fathoms; bottom, mud.

The shells of this species vary considerably in pattern; while in the type the white markings are rather large and few, in some the white predominates. In general style the shell somewhat resembles *C. tranquebaricus*, Gmelin, but it is broader in form, and has less numerous ribs, with no signs of longitudinal striæ or riblets between them.

Chylams humilis, n. sp. (Plate VI., fig. 3). Shell rather higher than broad, equivalve, equilateral, thin, compressed, reddish orange colour, with four yellowish rays; radiating riblets about 30 in number (with here and there a small intervening ridge), slightly imbricated, the lateral ones more distinctly so, the interstices crossed by sharp lamellæ. Auricles very unequal; the anterior broad, with about eight prickly ridges, the posterior small, ridges almost obsolete. Left valve nearly flat; right rather convex; sculpture similar in both valves.

Height, 16; width, 15; depth, 5 millim.

Hab.:—Great Fish Point, N.W., 9 miles, depth 51 fathoms; bottom, sand and shells (one specimen only). Cape St. Blaize, N. by E.$\frac{1}{4}$ E., 65 miles, depth 90 fathoms (a single specimen).

This little species appears to be very rare, only one specimen having been taken at each of the above stations. It presents no particularly striking characters, resembling somewhat in form and aspect the Mediterranean *C. Bruei*, Payr., the ribs being closer, more rounded, and not longitudinally lirate.

Fam. **Aviculidæ.**

Pinna squamifera, Sowerby. I mention this species here although it has already been recorded as South African by Mr. E. A. Smith (Proc. Malac. Soc., Vol. V., p. 394), because the largest specimen exceeds considerably in size the largest he mentions. The shell taken in Mossel Bay measures 14$\frac{1}{2}$ inches in length.

Fam. **Mytilidæ.**

Modiola rhomboidea, *Hanley* (Reeve, Conch, Icon. Modiola, fig. 28).

South Head, Tugela River, N. by W., 4$\frac{3}{4}$ miles, 25 fathoms; bottom, black mud.

Crenella striatissima, n. sp. (Plate VI., fig. 1). Shell obliquely oval, thin, inflated, pale straw-colour; the whole surface of the valves longitudinally very densely striated, striæ minutely granulose, here and there slightly divaricating; umbones minute, incurved. Interior silvery, margin minutely crenulated. Hinge narrow; in place of the four cardinal teeth usual in the genus, only a very slight rounded projection; anterior crenulated. Ligament long, rather thin, horny.

Length, 10 ; width, 8 ; thickness, 6 millim.

Hab. :—Lat. 34° 7′ S., Long. 25° 42′ 30″ E. ; depth, 56 fathoms ; bottom, rock (one complete shell).

Umhloti River Mouth, N.W. ½ W., 15½ miles ; depth, 100 fathoms (one valve).

This species is allied to *C. glandula*, Totten, but the shell is of a thinner substance, and the striæ are much finer.

Fam. **Arcidæ.**

Arca (Scapharca) Africana, n. sp. (Plate VI., fig. 4). Shell transversely oblong, slightly inequivalve, whitish, covered with a light brown periostracum, which is here and there bristly between the ribs ; anterior margin angular above, then rounded and obliquely receding towards the ventral margin, posterior slightly auriculate above, and roundly produced at the end. Ribs 25 in number prominent, biangular, more than half of those on the right valve crenulated with oblong transverse nodules, only the posterior ones being nearly smooth, while on the left valve the majority are smooth, only the anterior ones being nodulous ; interstices smooth. Umbones prominent, rounded, incurved, separated by the ligamental area, and situated rather near the anterior end of the shell. Ligamental area rather broad, flattened, short and angular in front, elongately produced behind. Interior of the valves white, strongly denticulate at the margin. Hinge line long, nearly straight ; teeth numerous, anterior ones narrow close and oblique, posterior shorter and thicker.

Length 18 ; width 25 ; thickness 15 millim.

Hab. :—Tugela River mouth, N. by W., 18 miles ; depth, 46 to 55 fathoms. Bottom, mud.

The shell is rather like *A. ferruginea*, Reeve, from which it differs chiefly in form, and particularly in the obliquity of the anterior margin.

Pectunculus castaneus, *Lamarck* (Reeve, Couch. Icon. Pectunculus, fig. 32). Table Mountain N. 79° E., 40 miles ; 250 fathoms (odd valves).

Fam. **Nuculidæ.**

Nuculana Belcheri, *Hinds** (Plate VI., fig 7). Although it is not new as South African, I mention here this fine characteristic species. It has hitherto been practically unknown

* *Nucula Belcheri*, Hinds, Proc. Zool. Soc., 1843. *Nuculana*, Link, 1807=*Leda*, Schumacher, 1817.

in this country, excepting from the figures and descriptions given by Hinds, Sowerby, and Reeve, and a single valve in the British Museum. The figures in Thes. Couch., and Couch. Icon., represent a shell with four distinct posterior angles; the fourth angle running from the umbones to the posterior of the ventral margin is probably much exaggerated, as Hinds gives only three angles, the fourth being only very faintly indicated, as is the case with all the specimens now to hand. The specimens range from 19 to 37 millim. from end to end, and vary in width, most of them being narrower in proportion than that figured in Sowerby and Reeve from the Metcalfe collection. The following are the principal localities in which they have been dredged :—

Cape Point Lighthouse, S.W. $\frac{3}{4}$ W., $2\frac{1}{2}$ miles; depth, 42 fathoms. (One of the largest specimens taken here).

Cape Point, W. by S. $\frac{1}{2}$ S., $3\frac{1}{4}$ miles; depth, 34 fathoms. (One of the largest specimens taken here.)

Cape St. Francis, N.E. $\frac{1}{4}$ N., 26 miles; depth, 75 fathoms (smaller specimens).

Lat. 34° 27′ S., Long. 25° 42′ 45″ E.; depth, 256 fathoms (medium sized and small specimens).

Cape Natal, N. by E., 24 miles; depth, 440 fathoms. One small specimen.

Nuculana lamellata, n. sp. (Plate VI., fig. 8). Shell elongately oblong, inæquilateral, rather solid, compressed, white, shining; concentrically rather closely ridged; ridges on the anterior surface flattened (leaving narrow shallow grooves) gradually becoming sharper and more distinct towards the posterior end, where they are raised into sharp thin lamellæ; near the middle of the valves the ridges are somewhat broken and divided, with an oblique tendency. Umbones small, slightly incurved, situated nearer to the anterior end than to the posterior. Cardinal area long, depressed, rather concave, with an extremely thin ligament on the inner edge. Anterior dorsal margin rather short, obliquely sloping; posterior longer, nearly straight, slightly sloping. Posterior side triangular, with three angular ribs from the umbones to the margin, with two concave spaces between, and traversed by the before-mentioned lamellæ. Interior of the valves slightly iridescent, with small somewhat indistinct anterior and posterior muscular scars, and a clearly defined pallial line rather near the margin, with a broad posterior sinus. Hinge slightly sloping on each side, and furnished with very numerous erect teeth; cartilage pit, small, obliquely triangular.

Measurement :—From anterior to posterior, 19 ; from umbones to ventral margin, 9½ ; umbones to posterior margin, 11 ; thickness (valves united) 5½ millim.

Hab. :—Cape Natal, W. by N., 6½ miles ; depth, 54 fathoms. Bottom, fine sand and algæ.

Cape Natal, W. by N., 12½ miles ; depth, 85 fathoms. Bottom, sand and shells.

The shell closely resembles *N. Belcheri*, but may readily be distinguished from it by the beautiful lamellæ at the posterior end. The specimens vary but little in size and proportions, and none of them approach the dimensions of the full-sized *N. Belcheri*.

Nuculana gemmulata, n. sp. (Plate VI., fig. 9). Shell resembling *N. lamellata*, but with four posterior ribs, surmounted by gem-like scales, the interstices being smooth, excepting for the growth-lines ; the ridges traversing the surface of the shell are more regular and equal. For the rest of the characters the description of *N. lamellata* will suffice.

Measurement :—From anterior to posterior, 20 ; from umbones to ventral margin, 9 millim.

Hab. : —Tugela River mouth, N.W. 20 miles ; depth, 37 fathoms. Umvoti River mouth N. by W. ½ W., 4½ miles ; depth, 27 fathoms. Bottom, sand and shells.

Nuculana compta, n. sp. (Plate VI., fig. 10). Shell of a moderately solid substance ; outer surface very pale straw colour, white towards the umbones, concentrically very closely and finely ridged : ridges rounded or slightly flattened, becoming finer on the anterior side, and obsolete on the posterior. Posterior dorsal margin nearly straight, or very slightly arcuate, terminating abruptly and forming almost a right angle with the posterior margin of the shell ; anterior moderately sloping, very slightly convex, rounded at the extremity ; ventral margin strongly arcuate. Cardinal area narrow, concave, with a narrow ligament on each side of the umbones. Umbones rounded, closely approximating, situated nearer to the anterior than to the posterior. Hinge with numerous erect sharp teeth ; cartilage pit extremely small, transversely oblong. Interior silvery white, abductor scars, and pallial line indistinct.

Measurement :—From anterior to posterior, 8½ ; umbones to ventral margin, 5½ ; thickness (valves united), 4½ millim.

Hab. :—Cape Natal, N. by E., 24 miles ; 440 fathoms. Two specimens only.

Unlike most of the species of Nuculana, this shell is not rostrate, but rather square on the posterior side.

Nucula irregularis, n. sp. (Plate VI., fig. 12). Shell obliquely triangular, of a moderately solid substance: outer surface light brown, traversed by numerous somewhat oblique slightly waved ridges, which are irregularly divided and diverging on the posterior side; numerous very thin radiating liræ may also be seen by the aid of a lens. Posterior dorsal margin obliquely sloping: anterior nearly vertical, forming a slightly acute angle with the umbones. Posterior cardinal area narrow, slightly concave; anterior broad, forming a slightly concave lunule, bordered by a narrow rounded rib, which is roughened by the crossing liræ. Umbones small, acute, obliquely raised. Interior silvery white, margin sharply crenulated; abductor scars of moderate size, broadly oval; pallial line simple. Hinge with 17 erect teeth on the posterior side, and seven on the anterior; cartilage pit oblique, oblong.

Measurement:—Anterior to posterior, 8; umbones to posterior end of ventral margin, 8; thickness (valves united), 4 millim.

Hab.:—Struis Point, N.W., 15 miles; depth, 48 fathoms. A sculptured shell, more oblique than *N. nucleus*.

Nucula sculpturata, n. sp. (Plate VI., fig. 11). Shell obliquely sub-ovate, rather thin, pale; outer surface concentrically rather closely ridged; ridges slopingly flattened on the under side, rather sharp above, traversed throughout by close distinct radiating sculpture; posterior side divided by a slightly angular depression, from which the ridges run obliquely to the margin; anterior with a rather broad scarcely depressed lunule, which is roughened by fine granular diverging ridges. Posterior dorsal margin convexly sloping; anterior concavely truncate; ventral arcuate. Umbones rather small, incurved, and anteriorly inclined. Interior and hinge, same as in *N. irregularis*.

Measurement:—Anterior to posterior, 9; umbones to ventral margin, 7; thickness (valves united), 5 millim.

Hab.:—Lat. 33° 3′ S., Long. 27° 57′ E.; depth, 34 fathoms.

An elaborately sculptured species resembling *N. nucleus* in form. The sharply divaricating ridges on the posterior side are remarkable.

Fam. **Carditidæ.**

Cardita pulcherrima, n. sp. (Plate VI., fig. 2). Shell roundly sub-ovate, of a rather thin substance, white variegated with light brown: ribs 19 in number, rather thick, high, ornamented

by numerous conspicuous close-set bead-like nodules; interstices somewhat wider than the ribs, concave, crossed by irregular concentric striæ or growth lines. Umbones situated on the anterior side, sharp at the apex, and incurved. Posterior dorsal margin convex slightly sloping; anterior truncate; ventral and lateral margins rounded. Posterior cardinal area narrow and concave; ligament rather short; anterior lunule rather narrow, very slightly depressed. Interior white, faintly radiately grooved; margin denticulated; posterior abductor scar irregular, subtrigonal, striated; anterior oblong-ovate; pallial line distinct, simple. Hinge rather thick, right valve furnished with two cardinal teeth, the posterior one thick and obliquely triangular, the anterior very small and diverging; left valve with one solid rounded tooth; in each valve the posterior cardinal lamina is rather long, terminating in a slightly raised rounded lateral tooth; anterior lamina shorter, with a slight thickening at the end scarcely to be called a tooth.

Measurement :—Umbones to ventral margin, 10; anterior to posterior, $9\frac{3}{4}$; thickness (valves united), 7 millim.

Hab. :—Cape Natal, W. by N., $6\frac{1}{2}$ miles; depth, 54 fathoms.

A very pretty little shell, in which the numerous prominent ribs have the appearance of chains of beads. In form it resembles *C. cardioides*, Reeve.

Fam. **Crassatellidæ.**

Crassatella Gilchristi, n. sp. (Plate VI., fig. 14). Shell transversely oblong, rather solid, somewhat compressed, very obtusely angled posteriorly; surface very finely decussated throughout with concentric and radiating striæ; concentrically ridged with rather broad, slightly-raised liræ, about equal in width to the interstices, becoming obsolete at each end; covered with a thin brown periostracum. Posterior dorsal margin rather straight, sloping, terminating in a very obtuse, rounded angle; anterior truncated, rather convex; posterior lateral margin sloping, very slightly convex, anterior rounded; ventral margin rather straight, obliquely rounded at the anterior end, and roundly angled at the posterior. Umbones minute, scarcely curved; posterior cardinal area rather short, impressed, slightly concave; anterior lunule rather long and narrow. Interior white, margin serrated; anterior abductor scar rather large, irregularly oblong-oval; posterior short, angular in front, rounded behind; anterior pedal retractor small, sunken; pallial line simple. Hinge

rather broad, with two anterior serrated cardinal teeth in each valve, a narrow diverging posterior one, and a rather broad, deep cartilage pit between; lateral teeth narrow and but little raised.

Measurement:—Anterior to posterior, 29; umbones to ventral margin, 21½; thickness (valves united), 14 millim.

Hab.:—Martha Point (South Coast), N ¾ W., 9½ miles; depth, 42 fathoms; bottom, green mud (one specimen only).

Crassatella angulata, n. sp. (Plate VI., fig. 16). Shell transversely oblong, angular behind, rounded in front, whitish, covered with a light yellowish brown periostracum, very finely, concentrically striated, roughly and irregularly plicated with growth lines; posterior side rather concave, with an obtuse rounded, somewhat-incurved angle from the umbones to the lower extremity. Posterior dorsal margin long, rather straight, very slightly sloping, terminating in an obtuse angle; anterior short, sloping; posterior lateral margin nearly straight, rather oblique, anterior rounded, ventral slightly convex. Umbones minute, very slightly incurved, posterior cardinal area rather short, flattened, rather deep, rather broad in the middle and pointed at each end; anterior lunule rather long, with a narrow heart-shaped cartilage orifice. Interior white, smooth, minutely crenulated within the margin; abductor scars raised; pallial line simple. Hinge as in *C. Gilchristi*, but with lateral teeth shorter.

Measurement:—Anterior to posterior, 28; umbones to ventral margin, 18; thickness (valves united), 13 millim.

Hab.:—Umhlangakulu River Mouth, N.W. by N., 7½ miles; depth, 50 fathoms; bottom, sand and shells (one specimen only).

Crassatella Africana, n. sp. (Plate VI., fig. 13). Shell sub-ovate, compressed, rather thick, with a faint posterior angle; surface concentrically closely lirate, liræ raised and regular near the umbones, becoming irregular and less distinct towards the ventral margin, everywhere decussated by extremely fine concentric and radiating striæ, covered by a thin light brown periostracum. Dorsal margin sloping on both sides, posterior long, anterior rather short; anterior lateral margin rounded, posterior convexly truncate; ventral margin convex. Umbones minute, scarcely incurved; cardinal area rather long on each side, depressed, slightly concave, anterior narrow, posterior broader. Interior white, smooth, with a minutely crenulated margin; abductor scars, pallial line, and hinge as in *C. Gilchristi*.

Measurement :—Anterior to posterior, 30 ; umbones to ventral margin, 23 ; thickness (valves united), 14 millim.

Hab. :—Cape Infanta, N.E. by N. ½ N., 13½ miles ; 43 fathoms. Bottom, coarse sand, etc. (one specimen).

Crassatella abrupta, n. sp. (Plate VI., fig. 15). Shell short, subquadrate, somewhat inflated, very densely sculptured with fine raised granular radiating striæ, and concentric regular liræ ; liræ somewhat flattened, rather narrower than the interstices, becoming obsolete on the posterior side. Posterior dorsal margin rather convexly sloping, anterior rather concavely truncate ; posterior lateral margin nearly vertical, slightly convex, anterior rather prominent in the middle ; ventral margin roundly arcuate. Umbones small, slightly incurved anteriorly inclined ; cardinal area on both sides concave, posterior rather narrow, anterior rather broad. Interior whitish, posterior area suffused with pink, minutely crenulated within the margin ; abductor scars and pallial line as in the preceding species. Hinge with two oblong anterior cardinal teeth, which are strongly crenulated at the sides, and a long very narrow posterior one ; anterior lateral with three long thin laminæ, the inner one forming a very slightly prominent tooth ; posterior laminæ nearly straight and smooth.

Measurement.—Anterior to posterior, 16 ; umbones to ventral margin, 14 ; thickness (valves united), 10 millim.

Hab. :—Umhloti River Mouth, N.W. ½ W., 15½ miles ; depth, 100 fathoms. Bottom, hard ground.

This shell has very much the external appearance of an *Astarte*.

Crassatella tenuis, n. sp. (Plate VI., fig. 17). Shell transversely oblong, thin, compressed, pallid, angular behind, rounded in front ; surface sculptured with fine radiating thread-like striæ, and very close exceedingly fine concentric striæ ; concentric liræ thin, erect, rather distant ; posterior dorsal margin straight, nearly horizontal, obtusely angled ; anterior obliquely sloping, very slightly concave ; posterior lateral margin nearly straight, slightly oblique ; anterior rounded ; ventral margin long, rather straightly convex. Umbones minute, very slightly incurved ; cardinal area impressed, long, moderately wide, anterior rather deep.

Measurement :—Anterior to posterior, 26 ; umbones to ventral margin, 18 ; thickness (valves united), 8½ millim.

Hab. :—Cape St. Blaize, N. by E. ¼ E., 65 miles ; depth, 90 fathoms (one specimen only).

A very light compressed shell, somewhat resembling *C. subquadrata*, Sowerby.

Fam. **Cardiidæ.**

CARDIUM GILCHRISTI, n. sp. (Plate VII., fig. 1). Shell broadly sub-ovate, thin, inflated, white: surface elaborately sculptured: anterior side (rather less than half), very closely latticed with radiating and transversely undulated ridges, the interstices having the appearance of numerous minute pits; this portion of the surface is separated from the rest by a vertical line reaching from the umbones to the ventral margin. The remaining part has about 18 narrow prickly ribs, with two or three closely punctured grooves between each. Dorsal margin short, convexly sloping on each side: posterior lateral margin rather straightly convex, anterior and ventral rounded. Umbones broad, rounded; cardinal area small; ligament narrow and thin; lunule very small. Interior white, smooth, with serrated margin: abductor scars of moderate size situated rather high up, and very near the lateral margins: pallial line simple. Hinge rather narrow, with two unequal cardinal teeth in each valve, and rather prominent lateral teeth.

Measurement:—Posterior to anterior, 12; umbones to ventral margin, 13; thickness (valves united), 11 millim.

Hab.:—Algoa Bay, 15 fathoms.

A beautifully and curiously sculptured little shell, in two distinct patterns, each finishing abruptly in a subcentral vertical line. The sculpture of the posterior portion somewhat resembles that of *C. exasperatum*, Sowerby.

Fam. **Veneridæ.**

VENUS (ANAITIS) INTERSCULPTA, n. sp. (Plate VII., fig. 2). Shell transversely oval, rather compressed, yellowish white tinged with pink: concentric lamellæ high, reflexed, thin, corrugated; interstices decussated by numerous close radiating riblets which are here and there bifurcated, and fine concentric striæ. Posterior dorsal margin long, slightly arched; anterior short, concave; ventral margin roundly arcuate, obtusely angled at the end. Posterior cardinal area narrow, slightly impressed, roughly striated; lunule rather small and narrow, brown. Umbones acute, anteriorly inclined.

Measurement:—Anterior to posterior, $14\frac{1}{2}$; umbones to ventral margin, 11; thickness, $6\frac{1}{4}$ millim.

Hab.:—Between Bird Island (Algoa Bay) and the mainland, 10–16 fathoms.

The shell somewhat resembles *V. tiara*, Diller., but besides being of a more oblong form, it is distinguished by the peculiarly plicate character of the lamellæ and interstices.

Fam. **Ungulinidæ.**

Cryptodon investigatoris, Smith, Annals and Mag. of Nat. Hist., 1895.

Hab. :—Cape Point, N.E. ¾ E., 40 miles, 800 fathoms. One specimen only, less oblong than the Brit. Mus. specimen.

Fam. **Tellinidæ.**

Tellina Gilchristi, n. sp. (Plate VII., fig. 3). Shell transversely oblong, thin, compressed, nearly equilateral, pale straw-colour, rayed with light pink, with a few narrow concentric bands of red, concentrically very closely and somewhat irregularly grooved, without radiating sculpture; dorsal margin almost straightly sloping on each side; posterior lateral margin very short, biangular; anterior rounded; ventral margin slightly convex. Umbones small, nearly central, somewhat posteriorly inclined. Ligament rather large. Interior rayed with pale pink; hinge line narrow: right valve with two unequal cardinal teeth, anterior lateral tooth short and somewhat elevated, posterior obtusely angled and distant from the umbo; left valve the same, but with three cardinal teeth.

Measurement :—Anterior to posterior, 24; umbones to ventral margin, 15; thickness, 6 millim.

Hab. :—Off Cape Point Lighthouse, N.W. by W., 11¾ miles; 45 fathoms. Bottom, rough.

W. by N. ½ N., 10½ miles; 42 fathoms. N.W. by W. ½ W., 7¾ miles; 45 fathoms. S.W. ½ S., 2½ miles; 30 fathoms. N.W. ½ W., 4 miles; 50 fathoms.

The shell somewhat resembles a very small *T. virgata*, with which species, however, it will not bear any close comparison. The specimens, which are numerous, vary but little in size, and are apparently adult.

Tellina analogica, n. sp. (Plate VII., fig. 4). Shell transversely oblong, inequilateral, compressed, very thin and fragile, dull white, with pellucid concentric bands, very closely and irregularly concentrically grooved and ridged, obtusely biangular on the posterior side. Posterior dorsal margin sloping, slightly concave; anterior longer, less sloping, slightly convex; ventral margin slightly arcuate; cardinal area scarcely impressed, plicated. Ligament rather short. Umbones small, elevated, situated nearer the posterior than the anterior end of the shell. Interior smooth, white, with hinge same as in *T. Gilchristi*.

Measurement :—Anterior to posterior, 21½ ; umbones to ventral margin, 14 ; thickness (valves united), 5¼ millim.

Hab. :—Constable Hill (Saldanha Bay), S.E. by E., 10 miles ; depth, 55 fathoms. Bottom, mud.

Compared with *T. Gilchristi* this shell is of a thinner substance, white without rays of colour, more oval in form, and the umbones are situated nearer to the posterior end.

Tellina vidalensis, n. sp. (Plate VII., fig. 5). Shell transversely oblong, slightly compressed, convex towards the umbones, very inequilateral, salmon colour, concentrically, very finely, closely and somewhat irregularly grooved ; anterior dorsal margin long, convex, slightly oblique ; posterior short, obliquely sloping ; anterior lateral margin rounded, posterior angular ; ventral margin obliquely convex. Umbones small, closely approximating, slightly posteriorly inclined, situated near the posterior end of the shell. Ligament rather short. Interior light rose pink, smooth ; hinge and muscular scars normal.

Measurement :—Anterior to posterior, 15½ ; umbones to ventral margin, 8½ ; thickness, 4¼ millim.

Hab.:—Cape Vidal, N.E. by N., 9 miles ; depth, 13 fathoms. Bottom, sand and shells (two specimens).

A donax-shaped shell, of an obliquely oblong form and pink colour, with very faint indication of rays. It does not seem to bear a close resemblance to any known species.

Tellina (Macoma) levior, n. sp. (Plate VII., fig. 6). Shell rounded, convex, nearly equilateral, thin and light, iridescent, concentrically very finely striated, and ridged with nearly obsolete growth lines ; posterior obtusely angled and slightly flexuose ; dorsal margin slopingly convex on each side ; anterior lateral margin rounded, posterior obtusely angled ; ventral margin slightly oblique towards the posterior end, then roundly convex. Umbones small, rather prominent, close together. Cardinal area impressed, with a rather narrow ligament occupying half the length. Interior white, smooth ; abductor scars and pallial line normal, but somewhat indistinct ; hinge line narrow, with three diverging cardinal teeth in each valve, and thin laminæ in place of lateral teeth.

Measurement :—Anterior to posterior, 16 ; umbones to ventral margin, 14 ; thickness (valves united), 8 millim.

Hab. :—Amatikulu River Mouth, N.W., 7½ miles ; depth, 26 fathoms. Bottom, mud. South Head, Tugela River, N. by W. 4¾ miles ; 25 fathoms.

This shell somewhat resembles *T. balthica* in form, but is distinguished by the thinness of its substance, and narrowness of the hinge line, as well as by the delicate texture and iridescence of its surface. The specimens are destitute of colour bands, but have mostly the remains of a light brown epidermis about the margin.

TELLINA (MACOMA) ORDINARIA, n. sp. (Plate VII., fig. 7). Shell obliquely oval, inequilateral, compressed, thin, sordid white, with a thin greenish periostracum, concentrically very finely striated, posterior side obscurely angled. Posterior dorsal margin short, convexly sloping; anterior longer, oblique, slightly convex; lateral and ventral margins rounded. Umbones small, rather acute, scarcely incurved, situated rather posteriorly; cardinal area very narrow and indistinct, with a thin ligament. Interior smooth, suffused with yellow: hinge line very narrow, with two small cardinal teeth in each valve, and no lateral teeth.

Measurement:—Anterior to posterior, 16; umbones to ventral margin, 13; thickness (valves united), 6½ millim.

Hab.:—Saldanha Bay, 10 fathoms.

A shell of ordinary appearance, very thin in substance, with a yellow interior.

TELLINA (MACOMA) AFRICANA, n. sp. (Plate VII., fig. 8). Shell oblong-oval, oblique, very inequilateral, compressed, white, very thin in substance, nearly smooth, concentrically very obscurely striated, with impressed growth lines towards the margin; posterior side obscurely angled, truncated; anterior somewhat produced. Posterior dorsal margin short, rather straight, sloping, obtusely angled; anterior long, oblique, very slightly convex; posterior lateral margin short, nearly vertical, obtusely angled above and below; anterior rounded; ventral margin arcuate. Umbones small, rather acute, erect, situated rather near the posterior end of the shell. Interior smooth, but showing growth lines, white, faintly tinged with light buff; hinge line very narrow, with small cardinal teeth, no laterals.

Measurement:—Anterior to posterior, 17½; umbones to ventral margin, 12; thickness (valves united), 6 millim.

Hab.:—Algoa Bay, 16 fathoms.

TELLINA (MACOMA) INCLINATA, n. sp. (Plate VII., fig. 9). Shell transversely oblong, slightly oblique, inequilateral, compressed, of a rather thin substance, dull white, with a very thin light brown periostracum, concentrically irregularly striated, and marked with growth lines; posterior side rather

acuminated, and slightly flexuose. Posterior dorsal margin almost straightly sloping, slightly concave near the umbones; anterior longer, rather convex; posterior lateral margin nearly vertical, obtusely angled above and below; anterior rounded; ventral margin longer, rather oblique, very slightly convex. Umbones small, slightly inclined towards the posterior side; cardinal area very narrow; ligament short. Interior white; hinge line very narrow, with small cardinal teeth; no lateral teeth, but in the left valve the narrow posterior lamina terminating abruptly gives almost the appearance of one.

Measurement:—Anterior to posterior, 32½; umbones to ventral margin, 20; thickness, 10 millim.

Hab.:—Tugela River Mouth, N. by W., 27 fathoms.

ERVILIA PURPUREA? (DESHAYES).

Buffalo River (two miles above the jetty).

I name this with some doubt, the shells being more fragile than the typical form from the Red Sea. It may prove to be a distinct species.

Fam. **Anatinidæ.**

POROMYA GILCHRISTI, n. sp. (Plate VII., fig. 10). Shell transversely oval, nearly equilateral, rather inflated, whitish, of a thin nacrous substance, with a very thin light yellowish-brown slightly scabrous epidermis about the margin; surface minutely punctured throughout, concentrically very finely and inconspicuously striated, and with very slight radiating ridges towards the posterior side. Dorsal margin slightly sloping on both sides, posterior very obtusely angled, anterior convex, rounded; ventral margin somewhat obliquely arched. Umbones prominent, approximating, incurved, slightly inclined anteriorly, nearly central; cardinal area slightly impressed, rather long and narrow, with a small subulate ligament. Interior silvery white; abductor scars irregular in form, rugose; pallial line rather broad, without sinus. Hinge with one somewhat prominent, mucronate cardinal tooth in the right valve, and two narrow diverging teeth in the left.

Measurement:—Anterior to posterior, 25½; umbones to ventral margin, 18½; thickness (valves united), 13 millim.

Hab.:—Umtwalumi River Mouth, N. by W., seven miles; 50 fathoms.

Only one specimen of this fine species has been found. All the species of this genus appear to be extremely rare, and this applies to all those described in this paper, as well as those previously known. *P. Gilchristi* somewhat resembles at first

sight *P. hyalina*, Sowerby, which has been found in the China Sea, but it differs considerably both in form and sculpture from that species.

Poromya striata, n. sp. (Plate VII., fig. 11). Shell transversely sub-ovate, inequilateral, rather inflated, of a thin nacrous substance, covered by a thin light buff scabrous epidermis: posterior side obtusely biangular, anterior rounded; surface very finely and closely granular, rayed with numerous very thin thread-like ridges. Posterior dorsal margin rather short, obtusely angled, nearly straight, slightly sloping; anterior slopingly convex; posterior lateral margin nearly vertical, anterior rounded; ventral margin arcuate. Umbones prominent, approximating, incurved, inclined anteriorly, situated rather nearer the posterior than the anterior side of the shell. Ligament small, immersed, very narrowly produced posteriorly. Interior silvery white. Hinge of moderate thickness; right valve with one prominent cardinal tooth, with a slightly curved cusp at the top, and a blunt point on each side; left valve with two small parallel teeth.

Measurement:—Anterior to posterior, 22; umbones to ventral margin, 16½; thickness (valves united), 11½ millim.

Hab.:—Vasco de Gama Pk. (False Bay), S. 75° E., 13½ miles; 166 fathoms.

This shell differs from *P. Gilchristi*, in being less regularly oval in form, rather more compressed, and in the character of the surface, which is covered with thin raised radiating striæ.

Poromya granosissima, n. sp. (Plate VII., fig. 12). Shell nearly equilateral, rather short, angularly acuminated above, rounded in front and below, posterior truncated with an obtuse but distinct angle from the umbones to the margin; surface very profusely and distinctly granular all over; granules minute, rounded, very close together, arranged so as to form fine close radiating ridges, where removed the surface of the shell is smooth. Posterior dorsal margin almost straightly sloping; anterior convex, much sloping; posterior lateral margin convexly vertical, obtusely biangular; anterior and ventral margins rounded. The area behind the posterior angle is flattened, or very slightly concave. Umbones prominent, nearly central, approximating, incurved, with a very slight anterior tendency at the apices. Cardinal area narrow, rather concave, bordered by an angular ridge on the right valve, and an extremely thin long and narrow ligament on the inner edge of the left. Interior silvery white; hinge of moderate thickness, with a thick prominent cardinal tooth in the right valve, and an oblique pit bearing a short rather

thick ligament under the posterior side of the umbo, while the left valve has two small diverging cardinal teeth, and a small supplementary ridge; no lateral teeth.

Measurement:—Anterior to posterior, 9; umbones to margin, 8; thickness (valves united), 5¼ millim.

Hab.:—Cape Natal, 54 fathoms.

This shell has much the form of the European *P. granulata*, Nyst, but it is much more closely and conspicuously granulated.

Poromya curta, n. sp. (Plate VII., fig. 13). Shell thin, ventricose, nearly equilateral, slightly inequivalve, raised at the umbones, rounded in front and below, posterior very slightly produced and truncated, obtusely angled; surface iridescent, covered with very minute somewhat distant granules which are more crowded in front of the posterior angle, forming radiating ridges towards the posterior dorsal margin, while concentric grooves or growth lines may be seen with a lens. Posterior dorsal margin sloping, slightly incurved, anterior much sloping, convex; posterior lateral margin obtusely biangular, anterior rounded. Umbones nearly central, tumid, anteriorly incurved at the apices; ligament external, narrow. Hinge narrow; cardinal teeth small, two in the left valve and one in the right. Interior silvery white, rayed with faint irregular striæ.

Measurement:—Anterior to posterior, 9½; umbones to ventral margin, 8½; thickness (valves united), 7 millim.

Hab.:—Cape Natal, N. by E., 24 miles; 440 fathoms.

The shell is unusually short, high and ventricose, otherwise it somewhat resembles the European *P. granulata*.

Fam. **Cuspidariidæ.**

Cuspidaria optima, n. sp. (Plate VII., fig. 16). Shell equivalve, inequilateral, thin, white, rounded in front, acuminated and shortly rostrate behind; surface obliquely ridged, ridges narrow and not very close, excepting near the margin, where they become more crowded and concentric. Umbones rather depressed, approximating, situated nearer the anterior than the posterior end of the shell. Posterior dorsal margin strongly incurved, with a concavely depressed area; anterior convexly sloping; ventral margin arcuate, slightly sinuated posteriorly; rostrum rather short, convexly rounded, obtusely angular at the sides. Interior silvery white, radiately striated; posterior abductor scar triangular, clearly defined, anterior indistinct; hinge normal, the process bearing the ligament being of moderate size.

Measurement :—Anterior to posterior, 32¼ ; umbones to ventral margin, 20½ ; thickness (valves united), 14 millim.

Hab. :—Umtwalumi River Mouth, N. by W., 7 miles, 50 fathoms.

A fine large species somewhat resembling the Australian *C. latisulcata*, Ten-Woods, but much more finely, closely and obliquely ridged.

Cuspidaria nasuta, n. sp. (Plate VII., fig. 14). Shell elongately pyriform, rather compressed, thin, whitish, rounded in front, attenuately produced behind ; surface somewhat rugose with irregular growth lines, a concave depression defining the rostrum. Posterior dorsal margin concave near the umbones, then horizontal and nearly straight ; anterior convex, slightly sloping ; ventral margin rather long, slightly arcuate ; rostrum long, rather narrow ; dorsal area concavely depressed, long and rather narrow ; umbones rounded almost touching one another. Interior smooth, muscular scars indistinct ; pallial line simple, with a very slight sinus on the posterior side ; cartilage pit very small.

Measurement :—Anterior to posterior, 21 ; umbones to ventral margin, 10 ; thickness, 7½ millim.

Hab. :—Cape Point Lighthouse, 85 fathoms.

Compared with *C. rostrata*, the body of the shell is more oblong.

Cuspidaria (Cardiomya) Gilchristi, n. sp. (Plate VII., fig. 17). Shell irregularly pyriform, moderately inflated, thin, whitish, closely radiately ribbed throughout ; ribs regular, equidistant, rounded, rather broader than the interstices, becoming irregular on the posterior side, and almost obsolete on the rostrum. Umbones approximating, inclined towards the posterior side, and situated rather nearer the posterior than the anterior ; posterior dorsal margin deeply incurved ; anterior arcuate ; rostrum rather short.

Measurement :—Anterior to posterior, 14 ; umbones to dorsal margin, 9 ; thickness, 7 millim.

Hab. :—Cape Natal, W. ¾ N., 12½ miles ; 85 fathoms.

Cuspidaria (Cardiomya) forticostata, n. sp. (Plate VII., fig. 15). Shell sub-pyriform, rather compressed, whitish, radiately ribbed ; ribs very unequal, on the anterior side (about one-third of the entire surface), they are about 30 in number, rather close together, narrow, rounded, and but little raised, then from the central area inclining towards the posterior side are three much more elevated, narrow and diverging, with broad flatly depressed interstices, from thence to the

end of the rostrum, eight moderately raised, with interstices of intermediate width; concentric growth lines distinct, rather irregular, here and there slightly lamellose, especially on the posterior side. Posterior dorsal margin very slightly incurved; anterior short, obtusely angled, truncated; anterior lateral margin rather convex; ventral rounded, then obliquely raised towards the posterior side; rostrum rather short, wedge shaped; umbones rounded, closely approximating, situated nearer to the anterior than to the posterior side of the shell; dorsal area scarcely defined.

Measurement:—Anterior to posterior, 13; umbones to ventral margin, 8; thickness, $6\frac{1}{4}$ millim.

Hab.:—Cape Natal, N. by E., 24 miles; 440 fathoms.

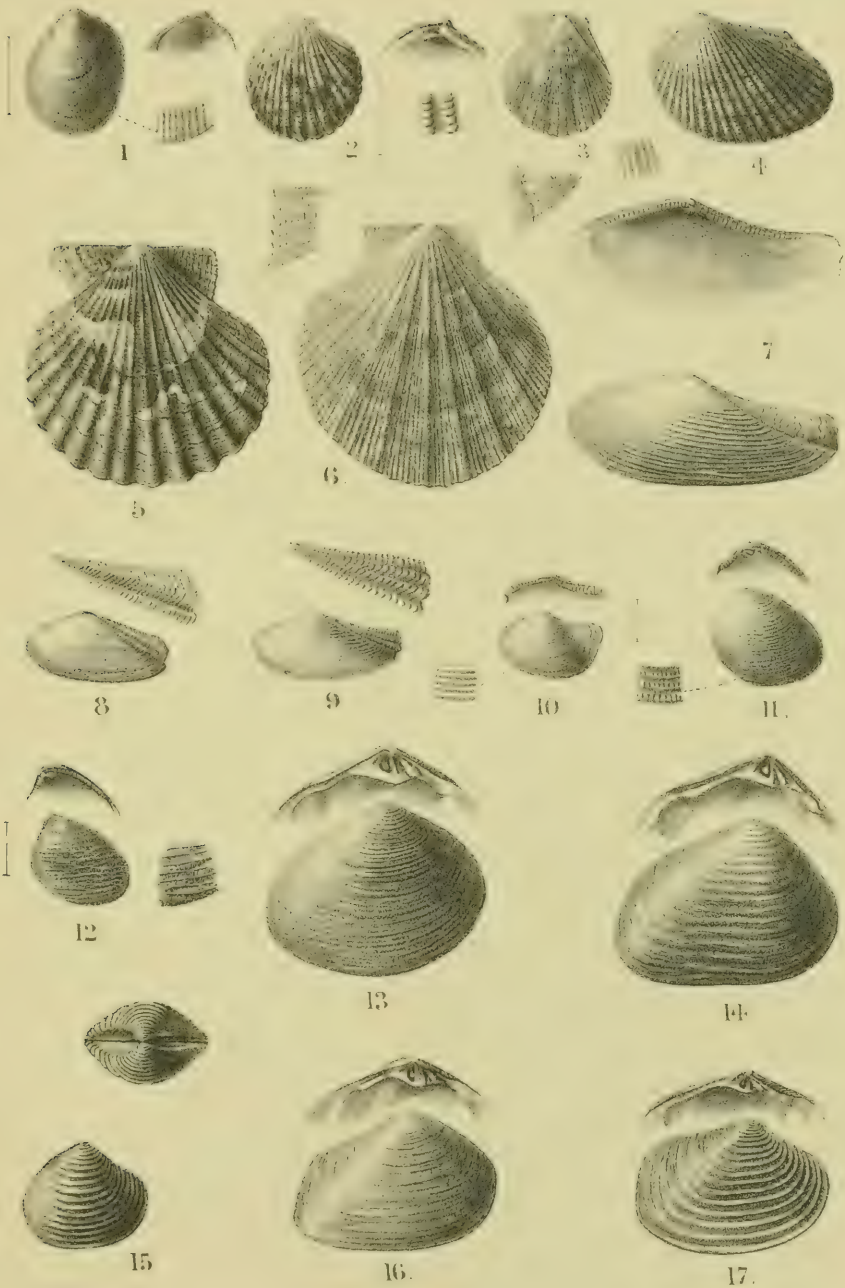
The species is somewhat similar to *C. Alcocki*, Smith, but it has a shorter rostrum, and differs from it in other respects.

Erratum.

Mollusca Vol. II., page 224; delete line 2, and put a comma at the end of line 1 (after the word "above").

The line to be deleted forms part of the description of the second species on page 222, and has unaccountably been repeated as above.

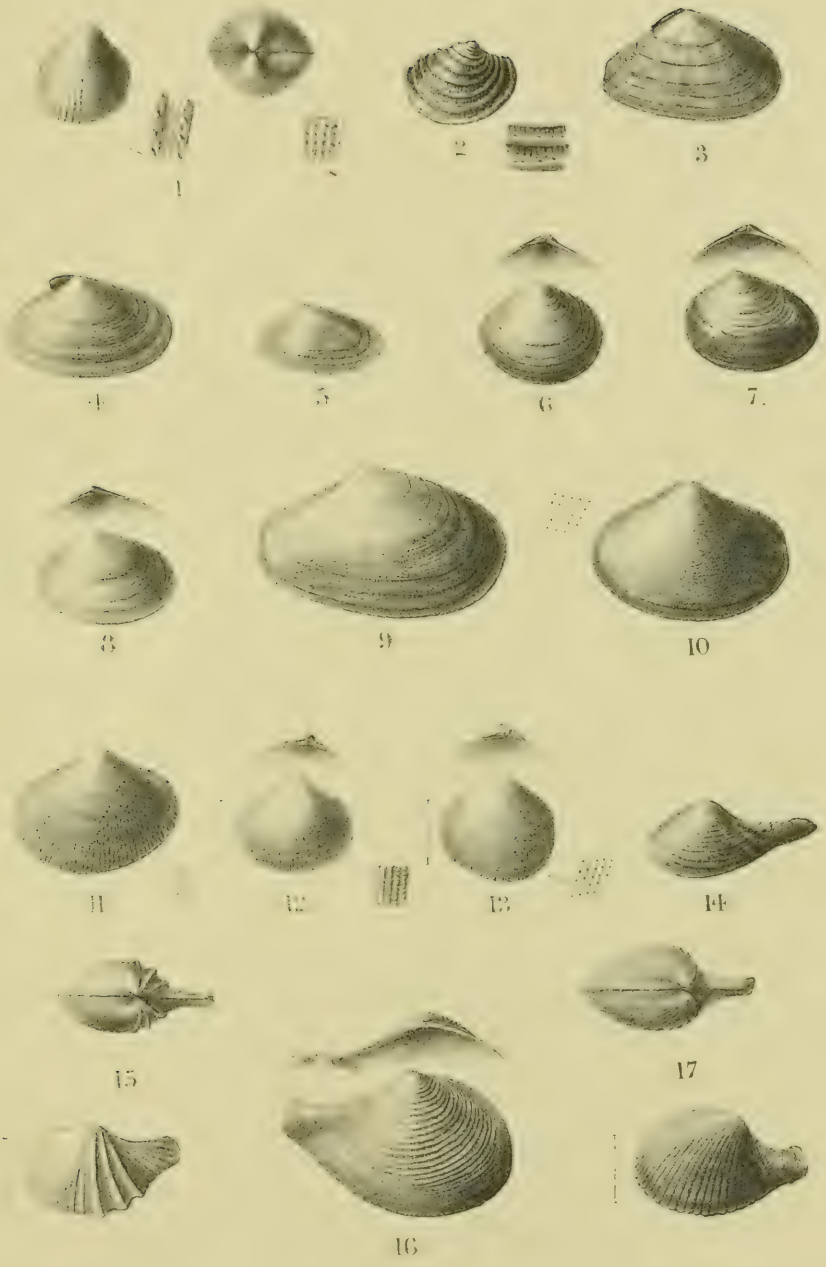
[Published 15th November, 1904.]



J. Green del. et lith.

Mintern Bros imp

1. CRENELLA STRIATISSIMA.
2. CARDITA PULCHERRIMA.
3. CHLAMYS HUMILIS.
4. ARCA AFRICANA.
5. CHLAMYS FULTONI.
6. CHLAMYS GILCHRISTI.
7. NUCULANA BELCHERI.
8. „ LAMELLATA.
9. „ GEMMULATA.
10. „ COMPTA
11. NUCULA SCULPTURATA.
12. „ IRREGULARIS.
13. CRASSATELLA AFRICANA.
14. „ GILCHRISTI.
15. „ ABRUPTA.
16. C. ANGULATA.
17. C. TENUIS



J. Green del. et lith. Mintern Bros. imp.

1. CARDIUM GILCHRISTI.
2. VENUS INTERSCULPTA.
3. TELLINA GILCHRISTI.
4. „ ANALOGICA.
5. „ VIDALENSIS.
6. MACOMA LEVIOR.
7. „ ORDINARIA.
8. „ AFRICANA
9. „ INCLINATA.
10. POROMYA GILCHRISTI.
11. POROMYA STRIATA.
12. „ GRANOSISSIMA.
13. „ CURTA.
14. CUSPIDARIA NASUTA.
15. „ FORTICOSTATA.
16. C. OPTIMA.
17. C. GILCHRISTI.

SOUTH AFRICAN CRUSTACEA.

PART III.

BY THE

REV. THOMAS R. R. STEBBING,

M.A., F.R.S., SEC. L.S., F.Z.S.

In the present contribution two new genera are instituted. One of them, *Exodromidia*, based on Studer's *Dromidia spinosa*, appeals for attention by the fact that the hitherto undescribed male proves to be furnished with rudimentary appendages on four segments of the pleon. The other, *Leontocaris*, is remarkable among the Hippolytidae for the very unsymmetrical constitution of the second trunk-legs, making them according to the old classical idiom a pair that is not a pair. A species here added to the Dromiidean genus *Dynomene* will be found to have peculiarities not unworthy of notice. The new prawns, *Penaeus caeruleus* and *Sergestes gloriosus*, are not in general structure exceptional members of their respective genera. The *Penaeus*, however, has one very unusual character. In the ordinary preservative media which tend to bleach most crustaceans this species, at any rate for many months, retains unchanged the fascinating tints of blue with which it is adorned when living. The *Sergestes* for its part appears to surpass all congeneric rivals in the abundance of its luminous organs. Several species are discussed which do not claim to be new. The object has been in these cases either to throw some new light on the organisation of the species themselves, or to enable those engaged in the modern studies of variation and zoothalassography to test the accuracy of the identifications offered. It should be borne in mind that when all the available figures and descriptions relating to a particular genus have been compared, it is still often far from easy to determine whether a specimen in hand can or cannot be referred to any of them. Characters perhaps have been detected which in the abstract would entitle it to rank as a distinct species. But the decision may be rendered uncertain by various considerations. Some of the earlier descriptions may be manifestly imperfect, of

some the exactness may be seriously open to question, and, apart from these manufactured complications, there is one supplied by nature ready made, when, as in the case of *Neolithodes*, it allows an individual animal in the course of a lifetime to exhibit far greater differences of habit than are commonly required for establishing two valid species.

CRUSTACEA MALACOSTRACA.

BRACHYURA GENUINA.

OXYRRHYNCHA.

Fam. **Mamaiidae.**

1895. *Maiinae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIV., Pt. 2, pp. 166, 236.
1898. *Majinae*, Ortmann, Bronn's Thierreich, Vol. V., Pt. 2, Lieferung 52, p. 1168.
1899. *Maiinae*, Alcock, Deep-sea Brachyura of the "Investigator," p. 55.
1902. *Maiidae* (part), Stebbing, South African Crustacea, Pt. 2, p. 2.

Alcock divides the family Maiidae in the larger sense into four sub-families, Inachinae, Acanthonychinae, Pisinae, and Maiinae. I have heretofore explained that in raising these sub-divisions to the rank of families, the third ought to be called Blastidae. The introduction of the name Mamaiidae in place of Maiidae needs a somewhat fuller justification. The genus *Maja*, with the alternative spelling *Maia*, was established by Lamarck in 1801 (Système des Animaux sans vertèbres, pp. 154, 428), nominally to include the two genera which Fabricius had called *Inachus* and *Parthenope*. But the reference to Herbst which Lamarck gives for the first of these divisions has nothing to do with *Inachus*. It refers the reader to Herbst's description and figure of *Cancer maja*, which is a *Lithodes*. As both *Inachus* and *Parthenope* are still valid, *Maia* on its author's own showing has no standing place, and by no stretching of accepted rules can it be applied to a genus which is distinct from both of them. It is unnecessary, therefore, to insist on the further inconvenience that, as Miss M. J. Rathbun has already pointed out, *Maia*

was used by Brisson, 1760, for a genus of birds, accepted by many ornithologists. (Proc. Biol. Soc., Washington, Vol. XI., p. 160, 1897). For the well-known species *Maia squinado* (Herbst) I propose the generic name *Mamaia*, and this slight alteration will naturally apply to all such higher divisions as have taken their designations from the genus under its earlier name.

Gen. **Micippa,** Leach.

1817. *Micippa*, Leach, Zoological Miscellany, Vol. III., p. 15.
1825. *Micippa*, Desmarest, Consid. gén. Crust., p. 148.
1829. *Micippe*, Latreille, Règne Animal, Vol. IV., p. 59.
1834. *Micippe*, Milne-Edwards, Hist. Nat. Crust., Vol. I. p. 329.
1839. *Micippe*, de Haan, Crust. Japonica, decas quarta, p. 85.
1879. *Micippa*, Miers, Journ. Linn. Soc. London, Vol. XIV., p. 661.
1895. *Micippa*, Alcock, Journ. Asiat. Soc., Bengal, Vol. LXIV., Pt. 2, pp. 167, 238, 248.

Numerous other references will be found in Alcock's work either under the genus or its species. It may be mentioned that Desmarest gives the name correctly as *Micippa*, though by appending a French form of it, Micippe, he probably helped to mislead several of his successors. Alcock places this genus in an alliance Pericerοida, Miers and Miss Rathbun assign it to a sub-family Micippinae, to which the latter writer (Proc. Nat. Mus., Vol. XVI., p. 65, 1893) allots, besides *Micippa*, the four genera *Criocarcinus*, *Picrocerus*, *Pseudomicippe*, and *Paramicippa*, all of which are placed by Alcock in a separate alliance Stenocionopoida.

The Pericerοida are characterised as follows :—" Carapace usually broadened anteriorly by the outstanding orbits ; the orbits are either nearly or quite complete above and below, being formed by a strongly-arched supra-ocular cave in close contact with an excavated post-ocular lobe, a process of the basal antennal joint filling in the floor below." *Micippa* is distinguished by having " Carapace oblong ; rostrum broadly laminar, vertically or nearly vertically deflexed ; orbits complete but shallow.". (Alcock, loc. cit., p. 238). In the description of *M. thalia*, however, Alcock points out that in that species ' the floor of the orbit is incomplete."

Micippa thalia (Herbst).

1803. *Cancer Thalia*, Herbst, Krabben und Krebse, Vol. III., Pt. 3, p. 50, Pl. 58, fig. 3.
1839. *Pisa* (*Micippe*) *thalia*, de Haan, Crustacea Japonica, decas quarta, p. 98, Pl. G, and Pisa (Paramecippe) Thalia, Pl. 23, fig. 3.
1843. *Micippe thalia*, Krauss, Südafrik. Crustaceen, p. 51.
1884. *Micippa thalia*, Miers, Crustacea of "Alert," p. 198, and var. *haani*, p. 524.
1895. *Micippa thalia*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIV., Pt. 2, p. 251.

Miers and Alcock supply numerous references and an extensive synonymy, including *Paramicippa sexspinigera*, White, 1847; *Micippe miliaris*, Gerstäcker, 1856; *Micippa haani*, Stimpson, 1857; *Micippe pusilla*, Bianconi, 1869; *Micippa inermis*, Haswell, 1880; together with var. *aculeata*, Bianconi, 1851, and var. *caledonica*, Kossmann, 1877. De Haan (loc. cit, p. 99), no doubt with regard to the name given on his Plate 23, says that the eyes are all but entirely capable of enclosure within the orbits: therefore the species is to be referred not to *Paramicippa*, but to *Micippa*. He notes the absence of the two hindmost denticles of the thorax overlapping the pleon, which Herbst describes and figures. The want of these caused Krauss to say that the specimen which he names *M. thalia*, de Haan, cannot be assigned to *Cancer thalia*, Herbst. Probably on the same account Stimpson renamed de Haan's species *haanii* as distinct from Herbst's *thalia*. The specimen from the Durban Museum, preserved dry, is without these denticles, but has on the surface of the granular carapace the typical arrangement of large vertical spines, "one on either supra-ocular hood, two on the gastric region in the middle line, and two placed obliquely on either branchial region." The broad bifid rostrum is not quite vertically deflexed. The smoothness of the very slender cheliped is in rather striking contrast to the setose character of the carapace and the other legs. The dark coloured finger and thumb, which Alcock describes as minute in the adult female, are in this specimen about half as long as the palm.

The specimen from Natal briefly described by Krauss was only 5·5 lines wide by 6·5 lines in length, or about half an inch square. The Durban Museum specimen, a female, measures 31 mm. at the widest point of the carapace and 32·5 mm. along the median line from the base of the carapace. As in Krauss's

measurement, so here, the lateral spines are not included in the width. A second specimen, also dry, and also a female, is so densely clothed with extraneous growths, that an exact description would not be possible without a removal of its investiture. In this the finger and thumb of the cheliped show a minute denticulation of their inner margins, and are quite four-fifths of the palm in length. The carapace ,as well as could be judged, was 41 mm. wide by 43 mm. long.

Aurivillius (K. Svenska Vet.-Akad. Handlingar, Vol. xxiii., p. 52, Pl. 4, figs. 1, 1a, 1889), under the designation "*Micippa haanii*, Stimpson," takes account of the serrate hooking-setæ by help of which this species, like so many other Oxyrrhyncha, attaches extraneous objects to various parts of its organism.

Fam. **Blastidæ.**

1899. *Pisinæ*, Alcock, Deep-sea Brachyura of the "Investigator," p. 49.
1902. *Blastidae*, Stebbing, South African Crustacea, Pt. 2, p. 2.

Gen. **Scyramathia,** A. Milne-Edwards.

1902. *Scyramathia*, Stebbing, South African Crustacea, Pt. 2, p. 5.

The genus has been already discussed, with numerous references, in Part 2 of the present work.

Scyramathia hertwigi, Doflein.

1900. *Scyramathia hertwigi*, Doflein, in Chun's "Aus den Tiefen des Weltmeeres," fig. on p. 497.
1902. *Scyramathia hertwigi*, Stebbing, South African Crustacea. Pt. 2, p. 7, Pl. 6.
1903. *Scyramathia hertwigi*, Doflein, in Chun's "Aus den Tiefen," 2nd edition, fig. on p. 172.

Many additional specimens enable me to add one or two notes on this species. As shown in Doflein's figure (1903), the chelipeds of the male in some instances outstrip in length the long and slender second pair of legs.

As is the case with *Scyramathia carpenteri* (Norman), the female appears to rival the male in the size of the carapace and in the size and sharpness of its tabular elevations, while its chelipeds are comparatively short and slender. The finger in these has a rather peculiar bend, and its crenulation is closely adapted to that of the thumb. Both are slender. The pleon of the female is very large, and bulging with a crowd of eggs in specimens of very different sizes. The first segment is wider at the base than distally. The length of the segments increases from the second to the sixth inclusive, and the width increases from the second to the base of the sixth, the sides of which form a broad curve with the telson. The last three segments are much larger than those which precede, the sixth being the largest of all. The median lobe is proximal on the first two and the seventh, distal on the intervening segments, being much narrower than the lateral surfaces on all segments except the first and second.

The long pleopods take a large share in closely investing the great globular mass of eggs, which are deep brownish red in spirit.

Some of the specimens, especially the females, have the carapace overgrown with sponges that entirely disguise them, while the legs and distended pleon are left exposed. The legs of this species are so easily detached that, without special precautions, specimens that are perfect at the outset of a journey are almost sure to be mutilated in transit.

Locality.—Cape Point, N. 50° E., 18½ miles; depth, 180 fathoms; bottom, green sand and black specks, hardish ground. Five separate station numbers are given for this locality, the crab being taken in some abundance at all the five stations. All the females are loaded with eggs.

Since the above was in print, three additional specimens, all egg-laden females, have been sent me, from Cape Point, N. 50° East, 18½ miles. Depth, 180 fms. Bottom, green sand and black specks. These have a truly grotesque appearance, the superimposed sponge being in each case much larger than the crab. In allowing such towers of defence to grow upon their shoulders the crustaceans no doubt know their own business well enough, the protection being efficient and the burden in reality by no means heavy.

Fam. **Parthenopidae.**

1879. *Parthenopinae*, Miers, Journ. Linn. Soc., London, Vol. XIV., p. 668.

1895. *Parthenopinae*, Alcock, Journ. Asiat. Soc., Bengal, Vol. LXIV., Pt. 2, p. 258.

The definition of this group given by Miers was scarcely satisfactory, since, in limiting it to species with the carapace triangular or elliptical, it might be thought to exclude the titular genus *Parthenope*. Alcock avoids this by defining the group as one "in which the carapace is sometimes sub-pentagonal or ovate-pentagonal, more commonly equilaterally triangular, and sometimes almost semi-circular or semi-elliptical in outline; in which the cardiac and gastric regions are usually so deeply marked off from the branchial regions on either side as to make the dorsal surface of the carapace trilobed; in which the chelipeds are vastly longer and more massive than the ambulatory legs; and in which the rostrum is either simple or obscurely trilobed."

Gen. **Parthenope,** Fabricius.

1798. *Parthenope* (part), Fabricius, Suppl. Ent. Syst., p. 352.
1801. *Maja* (part), Lamarck, Syst. Anim. sans vertèbres, p. 154.
1834. *Parthenope*, Milne-Edwards, Hist. Nat. Crust., Vol. I., p. 359.
1895. *Parthenope*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIV. Pt. 2, pp. 258, 279.

This genus to which Fabricius attributed eight species, had been restricted, when Milne-Edwards published the first volume of his history of Crustacea, to the single *Cancer horridus* of Linnaeus. One or two Indian species have since been added to its still scanty register. It is "distinguished from *Lambrus* by the nature of the so-called basal antennal joint, which is relatively long, and nearly reaches to the level of the inferior orbital hiatus; the fingers also are much less turned inwards." (Alcock).

Parthenope horrida (Linn.)

1758. *Cancer horridus*, Linn., Systema Naturae, Ed. X., p. 629.
1788. *Cancer horridus*, Herbst, Krabben und Krebse, Pt. 7 p. 222, Pl. 14, fig. 88.
1798. *Parthenope horrida*, Fabricius, Suppl. Ent. Syst., p. 353.
1834. *Parthenope horrida*, Milne-Edwards, Hist. Nat. Crust., Vol. I., p. 360.
1895. *Parthenope horrida*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIV., Pt. 2, p. 279.

Alcock supplies numerous other references for this queer-looking, often-figured species. He cites Herbst with a mark

of interrogation. Herbst's figure is not one of the best, but can hardly refer to any species but the present. Rumph's Plate 9 in his Amboinsche Rariteitkamer, 1705, is an effective representation. Its name of Rotskrabbe or rock-crab is explained as indicating its likeness to a piece of coral rock. The name *Cancer spinosus* was used very indefinitely by Rumphius, the present being avowedly the fourth of four very distinct forms to which he applied it. Leach in the Zoological Miscellany, Vol. II., Pl. 98, p. 107 (1815), gives a striking coloured figure, but the colouring was probably only from a dried specimen. He describes it as "Horrid Parthenope; shell with the tubercles eaten-impressed; legs spiny, hands and wrists verrucated, abdomen and breast carious. Inhabits the Asiatic Ocean." There is a certain uncouth ruggedness about this rendering of the latin original, which tallies very well with the unconventional appearance of the crab. The animal evidently wishes to be regarded as a miscellaneous piece of corroded or eroded rock and it is taken at its own valuation by the Balani which settle on its humps and in its hollows, on its knobs and spines, without distinction of limbs and carapace. Good figures will be found also in Guérin's Iconographie, Crustacés, Pl. 7, fig. 1, and in the special edition of the Règne Animal, Crustacés, Pl. 26, fig. 2. These works are undated, but Guérin's plate is quoted in 1834, by Milne-Edwards, who refers to his own volume of that date when explaining Plate 26 of the Règne Animal.

Rumphius gives the breadth of the carapace in his specimen as four inches, which exactly corresponds with that of the specimen submitted to me from the Durban Museum. He says that the chelipeds are nine inches long, but neither in his figure nor in the specimen from Natal, do they appear to be much more than seven and a half inches in actual extent, though a length of nine inches may be obtained by measuring round the outer margin. The larger cheliped thickens considerably to the base of the short widely gaping thumb and finger. It is on the right in our specimen, as in the figures given by Rumphius and Herbst, but on the left in those by Leach, Guérin, and Milne-Edwards. The sub-pentagonal form of the carapace is obvious in all, and some minor differences in the representation of it may be due less to variation in the actual specimens than to the disguises caused by extraneous animals settled upon it.

From *Parthenope spinosissima*, A. Milne-Edwards, this species is distinguished by the shape of the carapace, the coarseness of the spines, and the smoothness of the fingers.

CYCLOMETOPA.

Fam. **Actaeidae.**

1898. *Actaeinae*, Alcock, Journ, Asiat. Soc. Bengal, Vol. LXVII. Pt. 2, pp. 78, 137.

Alcock divides the family Xanthidae into two sections, the first comprising the sub-families Xanthinae, Actaeinae Chlorodinae, the second the sub-families Menippinae, Oziinae, Pilumninae and Eriphiinae. For the Actaeinae he gives the following character, "Carapace usually much broader than long, and usually very profusely and profoundly lobulated; the anterolateral border is either divided into four blunt lobes or crenated. The front is about a third the greatest breadth of the carapace, sometimes a little more, sometimes a little less, and is divided into two rather prominent usually round-pointed lobes."

Gen. **Actaea,** de Haan.

1833. *Actaea*, de Haan, Crustacea Japonica, p. 18.
1834. *Cancer* (part), Milne-Edwards, Hist. Nat. Crust., Vol. I., p. 378.
1852. *Actaea*, Dana, U.S. Expl. Exp., Vol. XIII., p. 162.
1861. *Actaea*, Heller, Crust. des rothen Meeres, S.B. Ak. Wien, Vol. XLIII., p. 314.
1865. *Actaea*, A. Milne-Edwards, Nouv. Archiv. du Mus., Vol. I.. p. 259.
1875. *Euxanthodes*, Paulson, Crustacea of the Red Sea, p. 33.
1876. *Actaea*, Miers, Crustacea of New Zealand, p. 15.
1877. *Psaumis* (preocc.) Kossmann, Crust. des rothen Meeres, Malacostraca, p. 26.
1882. *Actaea*, Haswell, Catal. Australian Crustacea, p 43.
1886. *Actaea*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 118.
1898. *Actaea*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVII., Pt. 2, pp. 73, 137.
1900. *Actaea*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXII., p. 286.

This genus is placed by Haswell in the Xanthinae, a sub-family of the Cancridae, by Miers in the Cancrinae, a section of the Cancridae, by Miss Rathbun in the family Pilumnidae, by Alcock in the Actaeinae, a sub-family of the Xanthidae. The last named writer combines with it Dana's *Actaeodes*, and

enumerates seventeen Indian species, to which he supplies a valuable key or synoptic table. As not uncommonly happens when the species of a genus are numerous, the definition varies somewhat with the date, and is so to speak encrusted with alternative characters. Miers in 1876 spoke of the front as "not produced beyond the level of the orbits," but this is unsuitable to the type-species. In 1886 he says, "The post-abdomen in the male is five to seven-jointed." But for this should probably be read, "in the male five, in the female seven-jointed," in accordance with his own earlier statement, and with that of Paulson and Haswell. Alcock more explicitly writes, "Abdomen of the male five-jointed, somites 3, 4, 5 fused." He adds that the species are "small crabs, distinguished by the elaborate lobulation of the carapace, and by the form of the front, which is usually deep-cleft in the middle line to form two prominent round-pointed lobes. In the type species the lobes of the front are irregularly rounded but scarcely seem to be in any sense pointed. The lobulation of the carapace is a more striking than distinctive feature, since unfortunately it is shared by other genera such as *Daira*. The latter genus, however, is well marked by the peculiar notch in the front margin of the third maxilliped's fourth joint.

Actaea granulata (Audouin).

1826. *Cancer granulatus*, Audouin, Explication des planches de Savigny, Pl. 6, fig. 2.
1833. *Cancer* (*Actaea*) *granulatus*, de Haan, Crustacea Japonica, decas prima, p. 18 and (1835) decas secunda, p. 47.
1834. *Cancer Savignii*, Milne-Edwards, Hist. Nat. Crust., Vol. I., p. 378.
1847. *Actaea carcharias*, White, Proc. Zool. Soc. London, p. 224.
1858. *Actaea pura*, Stimpson, Proc. Ac. Sci. Philad., p. 32.
1865. *Actaea granulata*, A. Milne-Edwards, Nouv. Archiv. du Mus., Vol. I., p. 275.
1875. *Euxanthodes granulatus*, Paulson, Crustacea of the Red Sea, p. 33, Pl. 6, figs. 3, 3a.
1876. *Actaea granulata*, Miers, Crustacea of New Zealand, p. 16.
1882. *Actaea granulata*, Haswell, Catal. Australian Crustacea, p. 44.
1885. *Actaea granulata*, Filhol, Mission de l'Ile Campbell, p. 373.
1898. *Actaea granulata*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVII., Pt. 2, p. 151.

In establishing the genus de Haan mentions two species, first this of Audouin, and secondly *Xantho hirsutissimus*, Rüppell, but the only one which he describes is the present species, which must, therefore, be considered the type of his genus. The carapace, as de Haan and Haswell say, is glabrous, in the sense of being without perceptible hairs, but it is far from smooth, being like much of the chelipeds covered with granulated tubercles, for which Milne-Edwards uses the expression *framboisé* (misprinted *frambroisé*), meaning with a raspberry-like appearance. Haswell speaks of the carapace as narrow, which must be understood as relatively to other species, since it is, as usual, in the genus broader than long. The absence of setæ appears to have suggested the specific name *pura* employed by Stimpson. That author calls attention to the interesting detail that the peduncle of the eye has the anterior margin granulated, and mentions that the fingers of the walking legs are spinulose, with rows of spines. Alcock also observes that on these legs "the tubercles have sharper points and are many of them spiny, especially those on the dactyli." The adpressed surfaces of the joints of the limbs are smooth, but with more or fewer traces of granulation. Alcock notices that "the abdominal terga and the greater part of the sternum are covered with a mosaic of smooth-worn tubercles; the under wall of the carapace as far as the epimeral suture is granular." In our specimen the smoothing of the under wall is conspicuous, but the tubercles of the sternum and the pleon's dorsal surface though small, are not very much worn.

Actaea carcharias, White, from Swan River, Australia, is only briefly described by White, who speaks of it as nearly allied to *A. calculosa* (Milne-Edwards). It is not mentioned by Haswell in his Australian Catalogue. Alcock accepts it as a synonym of *A. granulate*, with which he considers *A. calculosa* to be closely related.

Filhol's mention of *Actaea granulata* is not to record its occurrence, but to question the accuracy of its inclusion by Miers in the Fauna of New Zealand, as it was not to be found in any of the New Zealand Museums, nor did the Paris collections possess any example from that locality. He thinks its known distribution in warm waters makes its occurrence in New Zealand improbable.

Locality.—The specimen, a male, was taken in a depth of 25 fathoms on a bottom of sand, specks, and shells, Umhloti River Mouth, N.W. by W.$\frac{3}{4}$W. The carapace is 20 mm. long, 25·6 mm. broad, and carries several little Balani, one of which is in the left orbit, seriously interfering with any movement of the ocular peduncle.

Fam. **Potamonidae.**

1897. *Potamonidae*, Ortmann, Zool. Jahrb., Vol. X., p. 296.
1898. *Thelphusidae*, de Man, Bull. Soc. Philomath. Paris, Ser. 5, Vol. X., p. 36.
1899. *Telphusidae*, 'Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVIII., Pt. 2, p. 2.
1900. *Potamonidae*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXII., p. 282.

An important key to the genera and numerous species of this family will be found in Ortmann's work above cited. Miss Rathbun gives a key to the West African species, distinguishing the genera *Parathelphusa*, Milne-Edwards, *Erimetopus*, Rathbun, and *Potamon*, Savigny, to which *Potamonautes*, McLeay, and *Geothelphusa*, Stimpson, are assigned as subgenera. De Man in his list of freshwater Brachyura " de l'Inde, de la Birmanie, de la presqu'île de Malacca et de l'Indo-Chine orientale," mentions five species as belonging to *Potamon* (*Potamonautes*), thirteen to *Potamon* (*Potamon*), and eight to *Parathelphusa*.

Gen. **Potamonautes,** McLeay.

1838. *Potamonautes*, McLeay, in Smith's Illustrations of the Zoology of South Africa, Invert., p. 64.
1843. *Thelphusa*, Krauss, Südafrik. Crustaceen, p. 37.
1884. *Potamonautes*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 214.
1893. *Potamonautes*, Ortmann, Zool. Jahrb., Vol. VII., p. 489.
1897. *Potamonautes*, Ortmann, Zool. Jahrb., Vol. X, p. 303.

McLeay, after giving " Fam. Thelphusidae, *Subgenus Thelphusa* Lat. *Th. perlata* M.-Edw. ; adds the remark, " I separate those species of *Thelphusa*, which, like the present, have a transversal crest in front of the shell, and call them *Potamonautes*." Ortmann divides *Potamon*, Savigny, into four interconnected groups, to which he gives the rank of subgenera, naming them *Potamon*, *Acanthothelphusa*, *Geothelphusa*, and *Potamonautes*. The last he distinguishes as having " lateral margins without spines behind the epibranchial tooth, the latter generally prominent ; post-frontal crest continuous, almost straight or only at the sides slightly waved." To this may be added from the earlier account by Miers that there are " sometimes one or more lateral teeth developed in front of the epibranchial tooth."

Potamonautes perlatus (Milne-Edwards).

1837. *Thelpheusa perlata*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 13.
1838. *Potamonautes perlata*, McLeay, Invert. Zool. S. Africa, p. 64.
1843. *Thelphusa perlata*, Krauss, Südafrik. Crustaceen, p. 37.
1886. *Thelphusa* (*Potamonautes*) *perlata*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 215.
1893. *Telphusa* (*Potamonautes*) *perlata*, Ortmann, Zool. Jahrb., Vol. VII., p. 489.
1897. *Potamon* (*Potamonautes*) *perlatum*, Ortmann, Zool., Jahrb., Vol. X., p. 303.

Many other references are supplied by Ortmann. Milne-Edwards, who spells the generic name indifferently *Thelpheusa* and *Thelphusa*, was not the first naturalist to use *perlatus*, which properly means "carried through," in the barbarous sense of "pearly." In this species the pearls, though very numerous, are excessively small. They are discernible on the orbital margin, the mesially-notched post-frontal ridge, the curved line of the antero-lateral borders, dispersed over the pterygostomiam regions, and lining the upper edges of the endostome. In the chelipeds they run along the two under edges of the fourth joint, and appear on the corresponding ridges in the second pair of legs, but seem to be obsolete in the three following pairs. On the other hand this joint in all the ambulatory legs has a pearly upper ridge, which is continued on to the next joint, where it is flanked by two other ridges in the second and third pairs, but only by a single ridge in the fourth and fifth pairs. The two terminal joints are grooved above. The chelipeds have many little transverse rows of granules on the upper surface of the fourth and fifth joints, and the seemingly smooth surface of the hand is found under a lens to be similarly diversified. The thumb and finger are long, with very unequal teeth along their confronting margins.

A specimen labelled as coming from "East London shore" has the carapace 24 mm. long, with the greatest breadth 30·75 mm.

Another specimen, like the preceding, a male, labelled as coming from "Princess Vlei (fresh water), near Cape Town," has the carapace 29 mm. long, by 39 mm. broad. In this larger specimen the "perlation" on the underside of the carapace is considerably more distinct. There was no other tangible difference between the specimens.

Fam. **Carcinoplacidae.**

1827. *Gonoplacieus* (part), Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 56.
1852. *Carcinoplacinae*, Milne-Edwards, Ann. Sci. Nat., Zool., ser. 3, Vol. XVIII., p. 164.
1852. *Gonoplacidae* (part), Dana, U.S. Expl. Exp., Vol. XIII., pp. 308, 310.
1886. *Carcinoplacinae*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 223.
1894. *Carcinoplacidae*, Ortmann, Zool. Jahr., Vol. VII., p. 685.
1899. *Carcinoplacidae*, Alcock and Anderson, Ann. Nat. Hist., ser. 7, Vol. III., p. 11.
1899. *Carcinoplacinae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, Lieferung 53, p. 1176.
1900. *Pseudorhombilinae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, pp. 286, 292, 297.

Miers pointed out that *Pseudorhombila*, Milne-Edwards, 1837, is the oldest generic name at present included in this group. No doubt in deference to this priority, Alcock adopted the name Pseudorhombilinae in place of Carcinoplacinae. But it must be observed that de Haan's *Curtonotus* was published some years before *Pseudorhombila*, and is therefore the premier genus in the group, although its original name, being pre-occupied, was cancelled by Milne-Edwards in favour of *Carcinoplax*. The group is distinguished by Alcock from four other sub-families, the Gonoplacinae, which have a subquadrate carapace, elongate eyestalks with long narrow orbits, the Prionoplacinae, in which the pleon is narrower at base than the interval between the last pair of legs, the Rhizopinae, in which the alternative characters seem rather too numerous for a natural family, and the Hexapodinae, in which the fifth pair of legs are wanting.

Gen. **Geryon,** Kröyer.

1836. *Geryon*, Kröyer, Naturhist. Tidsskrift, Vol. I., Pt. 1, pp. 13, 20.
1852. *Eucrate* (part), Dana, U.S. Expl. Exp., Vol. XIII., p. 310.
1856. *Chalaepus*, Gerstaecker, Arch. Naturg. Jahrg. 22, Vol. I., p. 118.

1874. *Geryon*, Sars, Vid.-Selsk. Forhandl. Christiania for 1873, p. 393.
1879. *Geryon*, S. I. Smith, Trans. Connect. Acad., Vol. V., Pt. 1, p. 35.
1881. *Geryon*, A. Milne-Edwards, C. R. Acad. Sci., Vol. XCIII., p. 879.
1886. *Geryon*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 223.
1890. *Geryon*, de Man, Notes from the Leyden Museum, Vol. XII., p. 69.
1894. *Geryon*, Ortmann, Zool. Jahrb., Vol. VII., p. 685.
1894. *Geryon*, A. M.-Edwards and Bouvier, Crust. Decap. de l'Hirondelle, fasc. 7, p. 41.
1896. *Geryon*, Caullery, Résult. camp. du Caudan, fasc. 2, p. 404.
1899. *Geryon*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1176.
1899. *Geryon*, Alcock, Deep-Sea Brachyura of the Investigator, p. 84.
1900. *Geryon*, M. J. Rathbun, American Naturalist, Vol. XXXIV., p. 586.
1900. *Geryon*, A. M.-Edwards and Bouvier, Crust. Decap. Travailleur et Talisman, p. 103.

A. Milne-Edwards and Bouvier place this genus among the Cyclometopa in the family of Galenidae. Alcock follows them with the slight difference that he places it in the sub-family Galeninae, family Xanthidae. Miers, in his "Challenger" report, assigns it to the Catometopa, fam. Ocypodidae, sub-fam. Carcinoplacinae, remarking that it is "very nearly allied both to *Pseudorhombila* and *Pilumnoplax*, and to the Cancroid genus *Galene*; it is distinguished from them by the considerable development of the lateral marginal spines of the carapace, and from *Pseudorhombila*, as figured by Milne-Edwards, by the more slender basal antennal joint, which does not reach the front." Miss Rathbun, Caullery, and Ortmann agree with Miers in arranging the genus among the Catometopa, the first placing it in the fam. Ocypodidae, the other two authors in the fam. Carcinoplacidae, Ortmann further specifying for it the sub-fam. Carcinoplacinae. The species *G. tridens*, Kröyer, and *G. longipes*, A. Milne-Edwards, are evidently very nearly allied, and similarly between *G. quinquedens*, Smith, and *G. affinis*, Milne-Edwards and Bouvier, the relationship is exceedingly close. On the other hand, *G. incertus*, Miers, is only doubtfully included in the genus.

Geryon quinquedens, S. I. Smith.

1879. *Geryon quinquedens*, S. I. Smith, Trans. Connect. Acad., Vol. V., Pt. 1, p. 35, Pl. 9, figs. 1, 1a, 1b, 2.
1881. *Geryon quinquedens*, S. I. Smith, Pr. U.S. Mus., Vol. III., p. 417.
1882. *Geryon quinquedens* (? part), S. I. Smith, Bull. Mus. Comp. Zoöl., Harvard, Vol. X., p. 6.
1886. *Geryon quinquedens*, S. I. Smith, Rep. U.S. Fish. Comm., for 1885, p. (27).
1894. *Geryon quinquedens*. A. Milne-Edwards and Bouvier, Crust. Decap. de l'Hirondelle, Camp. Sci. Prince de Monaco, fasc. 7, p. 41, figs. B.D. in text.
1900. *Geryon quinquedens*, M. J. Rathbun, American Naturalist, Vol. XXXIV., No. 403, p. 586, fig. in text.

The species is distinguished from *G. affinis* by smaller size, and by the absence of the marked dorsal and ventral channelling of the fingers, which the latter species exhibits in the walking legs. Milne-Edwards and Bouvier further say that in *G. quinquedens* the third, fourth, and fifth segments of the pleon in the male have a tendency to coalescence. That is not borne out by the two specimens of that sex from South Africa. The South African specimens show the obtuse tubercle at the base of the finger of the larger cheliped, which Smith mentions, but which is not mentioned or figured in regard to *G. affinis*. In our specimens there is a fine dorsal denticulation on the fourth, fifth, and proximal part of the sixth joints of the walking legs. Between the right and left chelipeds the hands show little difference as to length or breadth, but the right one is the thicker.

In the largest male the length along the middle of the carapace, therefore not including the frontal teeth, is 53 mm., the breadth between the apices of the hindmost teeth of the antero-lateral margins 66 mm. The length of the right hand is 43 mm. In the largest female the corresponding measurements are 60 mm., 66 mm., 38 mm. S. I. Smith records a series of male specimens in which the length of the carapace varies by successive increments from 30 to 130 mm., the largest intervals being between those which measured respectively 54 and 81, and 94 and 116 mm. The breadth varied from 37 to 152 mm. Milne-Edwards and Bouvier give for *G. affinis* a length of the carapace reaching 133 mm., by a breadth (apparently without the lateral spines) of 153 mm. Thus, either the size cannot be relied on for distinguishing *G. affinis* from *G. quinquedens*, or Professor Smith has included both species under one name. Between these alternatives the greater probability seems to lie with the

decision that only one species is in question, which with great increase of size exhibits some small correlated variations. Concerning a female, in which the carapace was 70 mm. long by 85 mm. broad, Professor Smith remarks that it was carrying approximately 47,000 eggs, the eggs being nearly spherical and about 0·74 mm. in diameter.

Locality.—Cape Point Lighthouse, N.E. ¾ E., 29 miles; depth, 470 fathoms; bottom, green sand from hard ground.

Gen. **Carcinoplax,** Milne-Edwards.

1833. *Curtonotus* (preocc.), de Haan, Crustacea Japonica, decas prima, p. 20.
1852. *Curtonotus*, Dana, U.S. Expl. Exp., Vol. XIII, p. 310.
1852. *Carcinoplax*, Milne-Edwards, Ann. Sci. Nat. Zool., Ser. 3, Vol. XVIII, p. 164.
1894. *Carcinoplax*, Ortmann, Zool. Jahrb., Vol. VII, p. 685.
1900. *Carcinoplax*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX, Pt. 2, pp. 298, 301.

It should be observed that de Haan included two species in his subgenus, the second of which, *C. vestitus*, has been referred to various genera, and now stands under *Pilumnoplax*, Stimpson. This species, which appears to be involved in some obscurity, is the only one of the two that McLeay and Krauss note as occurring in South African waters. *Carcinoplax setosa*, A. Milne-Edwards, and *C. integra*, Miers, are transferred to Kinahan's genus *Litocheira* by Alcock, who, on the other hand, places Wood-Mason's *Nectopanope longipes* in the present genus.

Carcinoplax longimanus (de Haan).

1833. *Cancer* (*Curtonotus*) *longimanus*, de Haan, Crustacea Japonica, decas prima, p. 20.
1835. *Cancer* (*Curtonotus*) *longimanus*, de Haan, Crustacea Japonica, decas secunda, p. 50, Pl. 50, fig. 1.
1852. *Carcinoplax longimanus*, Milne-Edwards, Ann. Sci. Nat., Zool., Ser. 3, Vol. XVIII., p. 164.
1894. *Carcinoplax longimana*, Ortmann, Zool. Jahrb., Vol. VII. p. 688.
1900. *Carcinoplax longimanus*, Alcock, Journ. Asiat. Soc., Bengal, Vol. LXIX., Pt. 2, p. 303.

Milne-Edwards in 1837 alludes to de Haan's figure of *Cancer* (*Curtonotus*) *longimanus* as being still unaccompanied by any description, but notes its close apparent proximity to *Pseudorhombila quadridentata* (Latreille). Dana in 1852 accepts the

identity of the genera and gives precedence to *Curtonotus*, but in the same year Milne-Edwards upheld the distinctness of his own genus and substituted *Carcinoplax* for the preoccupied name of de Haan's.

The present striking species is excellently portrayed in de Haan's figure and text, and again thoroughly described by Alcock. At all points the South African specimens prove themselves to be representatives of it, faithfully agreeing with those examined from Japan and the Indian Ocean.

The largest of three specimens, all males, measures in greatest width of carapace 59·5 mm., with a length of 45 mm. The two teeth of the antero-lateral margin behind the extra-orbital tooth, are, as is said to be usual in well-grown samples, all but obsolete.

In general effect the carapace looks like a biscuit or circle of light pastry lightly browned. In detail it is found to be broadly truncate behind, the anterior part being divided between a transversely grooved and sinuously emarginate front, and the two deep orbits each nearly as wide as the front. Alcock describes the orbits as shallow, but as the supra-orbital angle coalesces with the more advanced side of the front, practically the orbits on the inner side are deep. The upper border of the orbit is divided into two parts by a small suture line, the granulation or beading being stronger on the outer than on the inner of the two sections.

In the chelipeds of our largest specimen, that on the right has a fourth joint measuring in full 70 mm., with a hand in extreme length 107 mm., of which the immovable finger occupies 32 mm. The length of the hand in the left cheliped is 100 mm. In a slightly smaller specimen the hand of the right cheliped measures 100 mm., while the fourth joint is 71 mm. All three specimens agree in showing a conspicuous tooth near the end of the fourth joint, one projecting on each side of the short wrist, and, along the inner surface of the gradually-widening palm, a blunt crest ending in a blunt tooth. The teeth of the fingers are numerous and very unequal, the larger ones being more or less adapted for interlocking. One cheliped is slightly longer than the other, with the palm distally a little more widened, producing something of a gap at the base of the closed fingers. The larger cheliped is on the right in two specimens, but in the third, which is smaller, with the palm much less than twice the length of the fingers, it is on the left.

The colour in living animals is stated by de Haan to be "ex roseo caerulescens," which would seem to mean rose-red shaded with blue.

Fam. **Ocypodidae.**

1900. *Ocypodinae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 343.

Alcock divides the fam. Ocypodidae, in the larger sense, into three sub-families, Ocypodinae, Scopimerinae, and Macrophthalminae.

Gen. **Uca,** Leach.

1814. *Uca*, Leach, Edinb. Encycl., Vol. 7, p. 430.
1815. *Uca*, Leach, Trans. Linn. Soc., London, Vol. XI., pp. 309, 323.
1816. *Uca*, Leach, Encycl. Brit., Ed. 5, Suppl., Art. Annulosa, p. 413.
1817. *Gelasimus*, Latreille, Nouveau Dict. Hist. Nat., Vol. XII., p. 517. (Also *Gelasima*.)
1820. *Gelasimus*, Latreille, Dict. Sci. Nat., Vol. XVIII, p. 286. (*Gelasima*, p. 287.)
1825. *Gelasimus*, Desmarest, Consid. gén. Crust., p. 122.
1893. *Gelasimus*, Stebbing, History of Crustacea, Internat. Sci. Ser., Vol. LXXIV., p. 88.
1897. *Uca*, M. J. Rathbun, Proc. Biol. Soc. Washington, Vol. XI., p. 154.
1897. *Uca*, Ortmann, Zool. Jahrb., Vol. X., pp. 335, 346.
1900. *Gelasimus*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 350.

However much one may regret the loss of the long-used name *Gelasimus*, it seems impossible to retain it. Beyond dispute the *Uca* of Leach is the earlier. Desmarest, on whom Alcock appears to rely for upholding *Gelasimus*, admits that Latreille's definition of that genus exactly applies to the crustaceans Leach intended to place in his *Uca*. Leach referred to it *Cancer uka*, Shaw (Naturalist's Miscellany, 1802), and as this is distinct from *Cancer Uca*, Linn. (see Rathbun, loc. cit.), he was justified in renaming the species. He called it *Uca una*. Upon this evidence Desmarest declares that Leach erroneously referred to his genus the "*uca-una* de Pison et de Marcgrave," two authors of the pre-Linnean period to whom Leach makes no allusion whatever. Since the species which he actually referred to his genus really belonged to it, the validity of the genus would not have been destroyed, even if he had given an additional reference that was inappropriate. But he never did give the imaginary references which disquieted Desmarest,

though he subsequently added to the synonymy the " calling crabs " of Herbst and Bosc. Latreille at the first institution of *Gelasimus* attributed the genus to Buffon, though in 1820 he claims it as his own. He gave no reference for the name to any part of Buffon's works, and no such reference has since been discovered.

Uca arcuata (de Haan).

1835. *Ocypode* (*Gelasimus*) *arcuata*, de Haan, Crustacea Japonica, decas secunda, pp. 26, 53, Pl. 7, fig. 2.
1837. *Gelasimus arcuatus* (?), Milne-Edwards, Hist. Nat. Crust., Vol. II, page 52.
1843. *Gelasimus arcuatus*, Krauss, Sudafrik. Crustaceen, pp. 14, 39.
1882. *Gelasimus arcuatus*, Haswell, Catal. Australian Crust., p. 92.
1894. *Gelasimus arcuatus*, Ortmann, Zool. Jahrb., Vol. VII., p. 755.

Further references to H. and A. Milne-Edwards, Miers, Kingsley, and de Man, will be found in Haswell's and Ortmann's works above cited. H. Milne-Edwards in 1837 observes that de Haan's figure much resembled *G. platydactylus*, but that the description of de Haan's species was still unpublished. That, however, was a mistake, if we may trust the date " Decas Secunda, 1835 " printed at the foot of p. 25 in de Haan's work, of which the Decas Tertia is in like manner dated 1837. at p. 65. Ortmann expresses a doubt whether the specimens from non-Japanese localities assigned to this species by various authors really belong to it. Krauss speaks with tolerable confidence of the form to which he assigns the name, and which he found represented by swarms in the Bay of Natal. He says that the hands are bright red, the carapace and pleon grey-blue, agreeing pretty well with the mud in which they burrow. He states that the breadth is fourteen lines and the length eight. De Haan's measurement, " Thorax latus et longus 10‴," must be due to a slip, since it is in no correspondence with his illustration. A dry specimen, male, from the Durban Museum, measures 25 mm.. between the extra-orbital points, with a length of 15·5 mm., the little deflexed rostrum not included. Carapace, pleon, and ambulatory limbs are as figured by de Haan, but the eyes and chelipeds are missing, so that the identification is rather conjectural.

Fam **Varunidae.**

1900. *Varuninae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, pp. 288, 296, 400.

Alcock identifies this group with the Varunacea and Cyclograpsacea part, of Milne-Edwards, and the Grapsinae in part of Dana, Kingsley, Miers, and Ortmann, with the following definition :—" Front moderately or little deflexed, sometimes sublaminar ; the sub-orbital crest, which supplements the defective lower border of the orbit, is rather distant from the orbit and usually runs nearly in a line with the anterior border of the epistome ; antennal flagellum usually of good length ; the external maxillipeds do not often gape widely, though usually there is something of a gap, they are not traversed by any oblique hairy crest, their palp articulates with the middle of the anterior border of the merus [fourth joint], and their exognath is generally broad and is exposed throughout. The male abdomen, though not narrow, rarely covers all the space between the last pair of ambulatory legs."

Gen. **Varuna,** Milne-Edwards.

1830. *Varuna*, Milne-Edwards, Dictionnaire Classique d' Hist. Nat., Vol. XVI., p. 511.
1886. *Varuna*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 265.
1900. *Varuna*, Alcock, Journ, Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 400.

Varuna litterata (Fabricius).

1798. *Cancer litteratus*, Fabricius, Supplementum Ent. Syst., p. 342.
1799. *Cancer litteratus*, Herbst, Krabben und Krebse, Vol. III., Pt. 1, p. 58, Pl. 48, fig. 4.
1802. *Grapsus litteratus*, Bosc, Hist. Nat. Crust., Vol. I., p. 203.
1830. *Varuna litterata*, Milne-Edwards, Dictionnaire classique d'Hist. Nat., Vol. XVI., p. 511.
1835. *Trichopus litteratus*, de Haan, Crustacea Japonica, decas secunda, p. 33.

1837. *Varuna litterata*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 95, Pl. 14 bis, fig. 8.
1852. *Trichopus litteratus*, Dana, U.S. Expl. Exp., Vol. XIII., p. 336, Pl. 20, fig. 8 a-b.
1900. *Varuna litterata*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 401.

A great number of additional references will be found in Alcock's work above cited.

A dry specimen, of the female sex, from the Durban Museum, was devoid of chelipeds, but showed the characteristic H on the carapace, to which the specific name is due, and the setose armature of the ambulatory-natatory legs, to which de Haan alluded in the generic name *Trichopus*.

The carapace measured 23 mm. in breadth by 21·5 mm. in length.

Gen. **Planes**, Leach.

1825. *Planes*, Leach, in Bowdich's Excursion to Madeira and Porto Santo, p. 15, fig. 2.
1837. *Nautilograpsus*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 89.
1875. *Planes*, G. B. Sowerby, in Leach's Malac. Podophth. Britanniae, Explan. of Pl. 27.
1886. *Nautilograpsus*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 253.
1893, *Planes*, Stebbing, History of Crustacea, p. 95.
1900. *Planes*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 296.

The genus dates only from 1825, not from 1815, the year which Alcock assigns to Plate 27 in Leach's Malacostraca Podophthalmata Britanniae. That work was continued and completed by George Brettingham Sowerby in 1875, Plate 27 being one of the seven additional plates then added. Miers remarks that this genus "is allied in some particulars to *Trapezia* in the Cancroidea, and to *Litocheira*, Kinahan, in the Carcinoplacidae, from both of which it is distinguished by the broader basal antennal joint and the compressed and robust ambulatory legs." He observes that "there is probably but a single species of this genus (the common Gulf-Weed Crab), which occurs nearly everywhere on floating weed in the temperate and tropical seas of the globe, and has been referred to under many different specific names."

From the Grapsidae in restricted sense the genus is separated by having the front very slightly and simply depressed.

Planes minutus (Linn.).

1758. *Cancer minutus*, Linn., Systema Naturae, Ed. 10, Vol. I., p. 625.
1803. *Grapsus minutus*, Latreille, Hist. Nat. Crust. et Ins., Vol. VI., p. 68.
1837. *Nautilograpsus minutus*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 90.
1875. *Planes linnaeana*, Sowerby, in Leach's Malac. Podophth. Brit., Pl. 27, fig. 1–3.
1886. *Nautilograpsus minutus*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 254.

The "Challenger" collection included specimens from many and distant localities. After enumerating these, Miers says, "Specimens of this genus show a considerable degree of variation in the convexity of the carapace, the development of the antero-lateral marginal tooth, which is sometimes obsolete, in the coloration of the body and limbs, etc., but I cannot find any valid characters for the distinction of the numerous supposed species which have been described by authors." For the synonyms he refers to Kingsley, Proc. Ac. Philad., p. 202, 1880.

In regard to the specimens sent me from South Africa, Dr. Gilchrist wrote, "Five out of six crabs found on a piece of wreckage in False Bay in December last. They have a very characteristic patch of white porcelain-looking colour on the back. As you will see, this patch varies considerably in outline. The rest of the animal was of an uniform reddish colour, which seems to me to be turning somewhat black in the spirit."

The largest of the five measures 19 mm. down the centre of the carapace, the greatest breadth being 18·5 mm.

Another specimen, found on the shore at False Bay, had originally a pretty and delicate lilac blue tint, according to a coloured drawing of it, which Dr. Gilchrist kindly sent me. Since Miers speaks of specimens being found attached to *Ianthina*, the suggestion may be hazarded that this species is sometimes coloured to be in unison with that particular lodging.

Fam. **Sesarmidae.**

1900. *Sesarminae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, pp. 289, 296, 409.

The definition in the work named runs as follows :—

"Front strongly deflexed; the lower border of the orbit commonly runs downwards towards the angle of the buccal

cavern; the external maxillipeds leave a wide rhomboidal gap between them, *an oblique hairy crest traverses them from a point near the antero-external angle of the ischium* [third joint] *to a point near the antero-internal angle of the merus* [fourth joint]. Their palp articulates either at the summit or near the antero-external angle of the merus, and their exognath is slender and either partly or almost entirely concealed. The male abdomen either fills or does not quite fill all the space between the last pair of ambulatory legs. Antennal flagella variable."

Gen. **Sesarma**, Say.

1817. *Sesarma*, Say, Journ. Acad. Nat. Sci. Philad., Vol. I., p. 76.
1835. *Pachysoma*, de Haan, Crustacea Japonica, decas secunda, p. 33.
1843. *Sesarma*, Krauss, Südafrik. Crustaceen, p. 44.
1886. *Sesarma*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 269.
1888. *Sesarma*, de Man, Journ. Linn. Soc. London, Vol. XXII, p. 168.
1897. *Sesarma*, M. J. Rathbun, Proc. Biol. Soc. Washington, Vol. XI., p. 89.
1900. *Sesarma*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 409.

For this genus, which rests essentially on *Cancer quadratus*, Fabricius, 1798, a multitude of other references will be found in the authors above cited.

Sesarma catenatum, Ortmann.

1897. *Sesarma catenata*, Ortmann, Zool. Jahrb., Vol. X., p. 334, Pl. 17, fig. 9.

Of the four sections into which de Man in 1888 divided this genus, the present species belongs to the second, defined as "*Sesarmae* without an epi-branchial tooth behind the external orbital angles, and in which the upper margin of the palm of the anterior legs of the male bears two or more oblique, parallel, minutely pectinated ridges." Ortmann explains that it stands in relationship with *S. quadratum* (Fabricius), *S. erythrodactylum*, Hess, and *S. melissa*, de Man, "especially the latter, but is at once distinguished by the hairy fingers of the chelae and the peculiarly interrupted, milled ridge on the movable finger." Alcock in 1900 gives *S. melissa* as one of the synonyms of *S. quadratum*.

In Ortmann's specimen the carapace measured 24 mm. in breadth by 18 mm. in length, the front being 15 mm. In a dry specimen from the Durban Museum the measurements are 20 by 15 mm., the front 12·5 mm. A specimen (preserved in formalin) from Kaerbooms River, measures 22 by 17·5 mm., the width of the front being 13 mm. Another spceimen from the same locality, and, like all the preceding, of the male sex, is 20·5 mm. broad by 17 mm. long, with a front of 13 mm. A female from the same river is 15 mm. in breadth, 12·5 mm. long, with a front of 9·5 mm. In every case, therefore, the front was considerably more than half the width of the carapace, but the proportion between the several measurements proved to be variable. The four post-frontal lobes are prominent, and there is a rather deep depression behind each orbit. The sides are marked by five oblique striations. In the almost circular pleon of the female, the small terminal segment is deeply immersed in the broad and deep preceding segment.

The chelipeds of the male agree with Ortmann's description : " Upper margin of the palm with two oblique, horn-coloured crenate ridges, which with the tuberculated upper margin itself and another granular (but not horn-coloured) ridge, running somewhat remote from the upper margin on the outer side, enclose a rhombic area ; outer surface of the palm tuberculate only towards the upperpart, otherwise smooth ; inner surface with some irregular granules, but without vertical ridge ; both fingers at the base, near to and on the cutting edge, on both sides of it, beset with thick short hairs ; upper rim of the movable finger with four to five longish, longitudinal oval tubercles, each ribbed by many fine transverse bars, so that this finger's upper margin has a milled longitudinal ridge, divided by three to four depressions into four to five oval pieces." To this it may be added that the thick felt of hair occupies a wide space between the bases of the fingers, and that between this hairy mass and the spoon-shaped tips there is a short denticulate margin, in which small denticles are enclosed between others that are more prominent, and of these the proximal are larger than the distal. In the female the fingers close together with scarcely a trace of hair, but with denticles continued up to the bases.

Ortmann speaks of the merus or fourth joint in the ambulatory legs as $2\frac{1}{2}$-3 times as long as broad. In the South African specimens the lower proportion prevails. Also in both sexes the second and third pairs of legs have on the back of the penultimate and distal part of the ribbed antepenultimate joints a close felting of short hairs, which is not mentioned by Ortmann. In the corresponding joints of the fourth and fifth legs there

are a few little stiff setæ, such as are arranged in lines on the fingers of all the ambulatory limbs, but only the penultimate joint of the fourth legs shows a trace of the felting.

The dimensions and localities have been already mentioned. Dr. Ortmann's specimen was nominally from New Zealand, but he warns the reader that the habitat assigned could not be entirely trusted.

Fam. **Plagusiidae.**

1852. *Plagusinae*, Dana, U.S. Expl. Exp., Vol. XIII., pp. 333, 368.
1876. *Plagusiinae*, Miers, Catal. Crust. New Zealand, p. 45.
1880. *Plagusiinae*, Kingsley, Proc. Ac. Sci. Philad., pp. 189, 223.
1899. *Plagusiinae*, Ortmann, in Bronn's Thierreich, Vol. V, Pt. 2, Lieferung 53, p. 1178.
1900. *Plagusiinae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, pp. 289, 297, 436.

Alcock's definition is as follows :—"The front is cut into lobes or teeth by the antennular fossae, which are visible in a dorsal view as deep clefts ; the lower border of the orbit curves down into line with the prominent anterior border of the buccal cavern : the external maxillipeds do not completely close the buccal cavern, but they do not leave a wide rhomboidal gap, they are not traversed by any oblique hairy crest, their palp articulates near the antero-external angle of the merus, and their slender exposed exognath has no flagellum. The antennal flagella are short. The male abdomen fills all the space between the last pair of legs."

Gen. **Plagusia,** Latreille.

1806. *Plagusia* (part), Latreille, Genera Crust. et Ins., Vol. I., p. 33.
1829. *Plagusia* (part), Latreille, Regne Animal, Vol. IV., p. 51.
1835. *Grapsus* (*Plagusia*), de Haan, Crustacea Japonica, decas secunda, p. 31.
1837. *Plagusia* (part), Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 90.
1843. *Grapsus* (*Plagusia*), Krauss, Südafrik. Crustaceen, p. 42.
1852. *Plagusia*, Dana, U.S. Expl. Exp., Vol. XIII., p. 368.

1876. *Plagusia*, Miers, Catal. Crust. New Zealand, p. 45.
1900. *Plagusia*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, p. 426.
1900. *Plagusia*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXII., pp. 277, 281.

The genus originally included a species for which de Haan instituted his *Acanthopus*, using a pre-occupied name, for which Miers in 1876 substituted *Leiolophus*. In the latter, the fourth joint of the maxillipeds is much narrower than the third, instead of being equal to it in breadth. *Leiolophus*, as Miss Rathbun has discovered, is superseded by *Percnon*, Gistel, 1848.

Plagusia capensis, de Haan.

1835. *Grapsus* (*Plagusia*) *capensis*, de Haan, Crustacea Japonica, decas secunda, pp. 31, 58.
1837. *Plagusia tomentosa*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 92.
1838. *Plagusia tomentosa*, McLeay, Zool. South Africa, Invert., p. 66.
1843. *Plagusia tomentosa*, Krauss, Südafrik. Crustaceen, p. 42, Pl. 2, fig. 6 (front part of carapace).
1846. *Plagusia chabrus*, White, Ann. Nat. Hist., Vol. XVII., p. 497.
1852. *Plagusia tomentosa*, Dana, U.S. Expl. Exp., Vol. XIII., p. 370.
1878. *Plagusia chabrus*, Miers, Ann. Nat. Hist., Ser. 5, Vol. I., p. 152.
1882. *Plagusia chabrus*, Haswell, Catal. Austral. Crust., p. 111.
1886. *Plagusia chabrus*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 273, Pl. 22, fig. 1*d* (cheliped).

In describing his *Plagusia dentipes*, de Haan says that in the third and fourth legs the femur (or fourth joint) is armed on the anterior carina with five strong equal teeth, and that the median process of the front in the carapace is dentate, with six short teeth. From this he distinguishes *P. capensis* as having the femora in question armed on the anterior margin with ten unequal teeth, and the median process of the front granulate on the margin. While engaged on that part of his History of Crustacea, which appeared in 1837, Milne-Edwards was still unaware of these two descriptions, though acquainted with de Haan's figure of *P. dentipes*. Krauss, who gives references both to Milne-Edwards and to de Haan, does not explain why

he adopts the later name in preference to *capensis*. But he remarks that *P. tomentosa* (which he identifies with *P. capensis*) is extraordinarily near to *P. dentipes*, adding, however, to de Haan's discriminating marks, the want of granules on the sides of the carapace. Miers also notices in 1886 that the South African specimens which he has examined have the branchial regions smooth or nearly so. This is also the case with the specimens submitted to my investigation. It has indeed never been proposed to amalgamate *P. capensis* with *P. dentipes*, but many authors have made it a synonym of *P. chabrus* (Linn.), which in 1764, and for long afterwards, was laconically described as enjoying "thorace hirto suborbiculato mutico, manibus ovatis muricatis," and as living in the Indian Ocean. The specific name *chabrus* is hard to explain, unless it is a mistake for *scaber*. On the obscurity of the definition Herbst comments in 1788, an epoch when obscure definitions were far from uncommon. Moreover, though *P. capensis* is recorded from New Zealand, Tasmania, New South Wales, and Chili, as well as from South Africa, it has not been recorded from the Indian Ocean, which Linnaeus gives as the habitat of *P. chabrus*.

In this species the broad centre of the trifid front has in the male an apse-like border of tubercles, within which are planted two denticles transversely, while the apparently rounded apex is deflexed beyond the tubercles to a rather narrow truncate terminal line. There is also a low tubercle behind each lateral division of the front, as noted by Dana.*

In the female specimen the tubercles being less developed let it be seen that the median piece of the front which carries them has the sides somewhat sinuous.

In the chelipeds the last five joints have ridges of teeth or tubercles, those on the hands being longitudinal, some nine in number. Three or four on the movable finger become smooth and coalesce towards the apex. The broad fourth joint of the ambulatory limbs has three tolerably smooth ribs on the outer surface, and the anterior margin cut into a rather indefinite number of very unequal teeth. The remaining joints are strongly ribbed, and in common with the fourth joint have lines of conspicuous pubescence. The fingers have the concave margin armed with spines, successively larger towards the apex.

* In Dana's work, p. 370, the words *non multispinosus* over *P. tomentosa* are an obvious mis-print for *multispinosus*.

Fam. **Hymenosomatidae.**

1858. *Hymenosomidae*, Stimpson, Pr. Acad. Philad., p. 108 (54).
1886. *Hymenosominae*, Miers, Challenger Brachyura, Reports, Vol. XVII., pp. 275, 279.
1898. *Hymenosomidae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1168.
1900. *Hymenosomidae*, Stebbing, Proc. Zool. Soc. London, p. 520.
1900. *Hymenosomidae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXIX., Pt. 2, pp. 285, 291, 295, 385.

Ortmann transfers this family from the Catometopa to the Oxyrrhyncha, considering that the sternal position of the male genital orifices is outweighed by other features, the form of the second antennae, the presence of a rostrum, and the longitudinal position of the first antennae. Alcock, considering this transfer to be a decided mistake, although holding that the true position of the family is still doubtful, thus defines it :—"Small marine and estuarine Catometopes having a curious superficial resemblance to some of the Oxyrrhynch crabs of the Inachine sub-family, a resemblance heightened by the fact that the epistome is sometimes nearly as long as broad. The palp of the external maxillipeds articulates near the antero-external angle of the merus, but as the antero-internal angle of the merus is sometimes truncated the true relations of the palp are often not quite clear; the exognath is slender and partly or entirely concealed. There are no orbits, and the eyes are exposed and little retractile. (Carapace thin, flat, triangular or sub-orbicular, not very well calcified, usually produced to form a horizontal rostrum. Antennular fossae shallow and ill defined. Antennal peduncle slender. Buccal cavern square, the ischium [third joint] of the external maxillipeds well developed). Male openings sternal."

Gen. **Hymenosoma,** Desmarest.

1825. *Hymenosoma* (part), Desmarest, Consid. gén. Crustacés, p. 163.
1829. *Hymenosoma*, Latreille, Règne Animal, Ed. 2, Vol. IV., p. 63.
1837. *Hymenosoma*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 35.

1838. *Hymenosoma* (sub-gen. *Leachium*), McLeay, in Smith's Illustr. Zool. S. Africa, p. 68.
1843. *Hymenosoma*, Krauss, Südafrik. Crust., p. 51.
1886. *Hymenosoma*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 279.

The genus has been commonly assigned to Leach, but neither Desmarest nor any of his successors has given a reference to the place of publication. Leach probably only gave the name in manuscript. It is appropriate to the membranaceous character of the integument. Alcock distinguishes three types in the family, in one of which, exemplified by *Hymenosoma*, "there is no epistome and the external maxillipeds almost encroach on the bases of the antennules, which appendages are not connected by the front." Miers says, "Scarcely any trace exists of an epistome." Of the third maxillipeds Miers says that they are not arcuated, and have the third and fourth joints well developed, the fourth usually obliquely truncated, and bearing the following joint near its antero-external angle, at the distal extremity. The pleon of the male, he states, is very narrow, six-jointed, its base rarely occupying the whole width of the sternum between the last ambulatory legs.

Targioni Tozzetti, in Crost. Brachiuri of the Magenta, pp. 179, 184, speaks of the pleon in the male of *H. laeve* as seven-jointed, but that is perhaps an error. Latreille affirms that in this genus the number of the pleon segments varies, but never exceeds six. Tozzetti supposed that only males were known, probably being unaware that Krauss refers to the females of *H. orbiculare* as being smoother and much smaller than the males.

Hymenosoma geometricum, Stimpson.

1858. *Hymenosoma geometricum*, Stimpson, Pr. Ac. Philad., p. 108 (54).
1877. *Hymenosoma geometricum*, Targioni Tozzetti, Crost. Brachiuri Magenta, p. 182.
1886. *Hymenosoma orbiculare*, var (?) *geometricum*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 280.

Stimpson, who obtained both species together in Simon's Bay, says that his *H. geometricum* is tolerably near to *H. orbiculare*, but with the third joint of the third maxillipeds much more slender, scarcely shorter than the fourth joint; the hepatic region armed behind the angle of the orbit with a

small sharp lateral tooth or spine; length of the male carapace 0·318 of an inch, and its breadth at the bases of the chelipeds the same. For *H. orbiculare*, which was abundant, he refers us simply to Desmarest, Consid. gén. Crust., p. 163, Pl. 26, fig. 1, and Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 36.

The figure of the maxillipeds by Desmarest gives the third joint decidedly shorter than the fourth, but in his Atlas of Crustacea to the Règne Animal of Cuvier, Pl. 35, fig. 1, Milne-Edwards allots the advantage in length to the third joint. In both figures the stem of the exopod appears to fall considerably short of the apex of the fourth joint. In the specimen from False Bay which I have examined, the two joints are equal in length, including in the measurements the rather large tooth at the inner apex of the third, and the much smaller tooth at the outer apex of the fourth joint. The stem of the exopod reaches at least to the end of the last named tooth. The fourth joint in this species is transversely, not at all obliquely, truncate, so far agreeing more nearly with Desmarest's figure than with Milne-Edwards'. Of the pair of maxillipeds the two members are set widely apart.

Milne-Edwards in his description of *H. orbiculare* includes two spiniform teeth on each side of the epistome, one formed by the anterior extremity of the lateral margin of the buccal cavern, the other by the external orbital angle.

In the False Bay specimens there are two such teeth of considerable size, but the smaller, slenderer one, belonging to the buccal margin, lies so immediately beneath the other (which is a little granular at the base) that it may easily be overlooked. The still smaller but conspicuous hepatic (or subhepatic) tooth, which marks Stimpson's species, is neither mentioned nor figured by Desmarest and Milne-Edwards for *H. orbiculare*. There is also in our specimens a distinct, upturned angle on each side of the base of the rostrum, which those authors neither allude to nor represent. On the other hand, the regional markings to which the specific name *geometricum* probably refers, are well shown in Desmarest's figure of the earlier species. The ocular peduncle narrows from the base to the slightly bulging cornea.

Writers prior to Stimpson may have included two distinct forms under one name. We cannot, therefore, be sure that Krauss is really referring to *H. orbiculare*, when in the Südafrik. Crust., p. 51, he declines to confirm Desmarest's statement that the hands are smooth, "for the males," he says, "have long-haired chelipeds and legs; the much smaller females on the contrary chelipeds less hairy and almost smooth legs." The

females among our specimens have the palms of the chelipeds less inflated than those of the males, and with a less decided cavity between the bases of the closed thumb and finger, but there is little difference in hairiness. In both sexes the plumose setæ feather the long fingers of the walking legs almost to their tips.

The narrow, strongly-bent pleon of the male has a transverse setigerous ridge on the second and third segments. The fourth is wider at the base than the third, then narrows to the fifth, which is shorter than the tapering rounded-ended sixth.

A female, laden with eggs, has a carapace 9 mm. long by 8 mm. broad. In the largest male the carapace measured 8 mm. in length with a breadth of 7 mm. The length and breadth of *H. orbicularc* is given by Desmarest as about an inch. Krauss describes the specimens from Table Bay as 8·7 lines long by 7·4 broad.

Locality.—False Bay, Roman Rock, N.W.$\frac{3}{4}$N., $\frac{3}{4}$ mile; depth, 18 fathoms; bottom, sand and shells.

OXYSTOMATA.

References have already been given in earlier parts of these investigations to the discussion of this tribe by Alcock in 1896. In 1898 Ortmann adopts Alcock's classification (Bronn's Thierreich, Vol. V., Part. 2, Lieferung 52, p. 1156. In 1900 Miss Rathbun gives the following definition :—

"Carapace with the antero-lateral margins arcuate or orbiculate; sometimes subglobose or more or less oblong, with sub-parallel margins. Epistome much reduced. Buccal frame more or less triangular, produced and narrowed forward, with the margins anteriorly convergent. Six to nine pairs of branchiae. Efferent channels opening at the middle of the endostome, which is produced forwards. The afferent channels open either behind the pterygostomian regions and in front of the chelipeds, or at the anterolateral angles of the palate. First antennae folded longitudinally or obliquely. The genital organs of the male are exserted, either from the bases of the fifth pair of legs, or from the surface of the sternal plastron." (The American Naturalist, Vol. XXXIV., No. 402, p. 515.)

The families included are the Calappidae, Matutidae, Leucosiidae, and Dorippidae, the first three having the "legs normal in size and position," whereas the Dorippidae exhibit the "last two pairs of legs much reduced in size, and having a peculiar position in the dorsal plane of the body."

Fam. **Matutidae.**

1838. *Matutidae*, McLeay, in Smith's Illustrations of the Zoology of South Africa, Invert., p. 70.
1841. *Matutoidea*, de Haan, Crustacea Japonica, decas quinta, p. 126.
1852. *Matutidae*, Dana, U.S. Expl. Exp., Vol. XIII., pp. 390, 391.
1877. *Matutidae*, Miers, Trans. Linn. Soc. London, Zool. Ser. 2, Vol. I., Pt. 5, p. 241.
1896. *Matutinae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXV., Pt. 2, p. 139.
1898. *Matutinae*, Ortmann, Bronn's Thierreich, Vol. V., Pt. 2, Lieferung 52, p. 1163.
1900. *Matutidae*, Rathbun, American Naturalist, Vol. XXXIV., No. 402, pp. 515, 516.

The Matutidae are distinguished from the Calappidae by their " maxillipeds closing the buccal cavern ; the palp hidden," and from the Leucosiidae by having their " afferent branchial openings in front of the bases of the chelipeds."

Gen. **Matuta**, J. C. Fabricius.

1798. *Matuta*, Fabricius, Supplementum Ent. Syst., p. 369.
1817. *Matuta*, Leach, Zool. Miscellany, Vol. III., p. 12.
1838. *Matutinus* (sub-gen. *Matuta*), McLeay, Smith's Zool. S. Africa, Invertebrates, p. 70.
1881. *Matuta*, de Man, Notes Leyden Museum, Pt. 3, p. 109.
1893. *Matuta*, Stebbing, History of Crustacea, Internat. Sci. Ser., Vol. LXXIV., p. 126.
1896. *Matuta*, Alcock, Journ. Asiat. Soc., Bengal, Vol. LXV., Pt. 2, pp. 139, 153.

For numerous references in addition to those supplied in connection with the specific discussion, and for a full treatment of the characters distinctive of the family and genus, Alcock's work should be consulted. Among other features of the genus it may be noted that " on removal of the external maxillipeds a deep undivided efferent canal is seen in the roof of the endostome, which groove is closed below by an elongate lamellar process of the first pair of maxillipeds." Also " the four ambulatory legs have the form of swimming-paddles, the two terminal joints being broadened and compressed—in the first and last pairs of legs enormously so." Curiously Rüppell and

Krauss agree in maintaining that this form has deluded their predecessors into supposing that the species of *Matuta* were swimming crabs. Rüppell even supposes that no crabs properly deserve that appellation, but he feels sure that the sharp, flattened feet in *Matuta* are only to enable the creatures to slip easily into the sand. Ortmann, however (Bronn's Thierreich, Vol. V., Pt. 2, p. 1232, 1899) assures us that he has himself seen *Matuta* swimming, shooting laterally through the water after the fashion of the Portunidae.

Matuta lunaris (Forskäl).

1775. *Cancer lunaris*, Forskäl, Descr. Anim. in Itinere orientali, p. 91, No. 44.
1781. *Cancer victor*, Fabricius, Species Insectorum, Appendix, p. 502.
1783. *Cancer lunaris*, Herbst, Krabben und Krebse, Heft 2–5, p. 140, Pl. 6, fig. 44.
1783. *Cancer victor*, Herbst, Krabben und Krebse, Heft 2–5. p. 143.
1793. *Cancer victor*, Fabricius, Ent. Syst., Vol. II., p. 449.
1798. *Matuta victor*, Fabricius, Supplementum Ent. Syst., p. 369.
1799. *Cancer lunaris*, Herbst, Krabben und Krebse, Vol. III., Heft 1, p. 43, Pl. 48, fig. 6.
1802. *Matuta victor*, Bosc, Hist. Nat. Crust., Vol. I., p. 225, Pl. 4, fig. 3.
1802. *Matuta appendiculata*, Bosc, Hist. Nat. Crust., Vol. I., p. 225.
1806. *Matuta victor*, Latreille, Genera Crust. et Insect., Vol. I., p. 42.
1817. *Matuta lunaris*, Leach, Zool. Miscellany, Vol. III., p. 13, Pl. 127, figs. 3–5.
1830. *Matuta Lessueri*, Rüppell, Beschreibung 24 Kurzschwänzigen Krabben, p. 7, Pl. 1, fig. 3.
1837. **Matuta victor*, Milne-Edwards, Atlas du Règne Animal, Ed. 3, Crust., Pl. 7.
1837. *Matuta victor*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 115, Pl. 20, figs. 3, 6.
1838. (*Matutinus*) *Matuta Victor*, McLeay, Smith's Zool. S. Africa, Invertebrates, p. 70.
1841. *Matuta victor*, de Haan, Crustacea Japonica, decas quinta, p. 127.
1843. *Matuta victor*, Krauss, Südafrik. Crust., pp. 16, 52.
1852. *Matuta lunaris*, Dana, U.S. Expl. Exp., Vol. XIII., p. 395 (together with *M. victor*).

* Or earlier, but not later, as the plate is quoted by Milne-Edwards in his Hist. Nat. Crust., Vol. II.

1875. *Matuta victor*, Paulson, Crustacea of the Red Sea (in Russian), p. 75.
1877. *Matuta victrix*, Miers, Trans. Linn. Soc. London, Zool. ser. 2, Vol. I., Pt. 5, p. 243, Pl. 39, figs. 1–3.
1886. *Matuta victrix*, Miers, Challenger Brachyura, Reports, Vol. XVII., p. 295.
1896. *Matuta victor*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXV., Pt. 2, pp. 158, 160.
1899. *Matuta victor*, Nobili, Ann. Mus. Genova, Ser. 2, Vol. XX., (40), Nov., p. 21.

Herbst refers to the Species Insectorum, Vol. II., Appendix, p. 502 (1781) for the first mention of *Cancer victor*, Fabricius. In my own copy of that work there is no such Appendix, and after Herbst no one but Miers appears to give the reference. In 1793 Fabricius identifies his species with Forskäl's, from whom, therefore, he ought to have adopted the name *lunaris*, a name dating back to the work of Rumphius in 1705 (p. 11, Pl. 7, letter S). Rumphius explains that in Amboina it was known as the full moon's crab, as being best caught by the light of the full moon. Herbst in his third volume, re-describing and re-figuring *C. lunaris* from fine specimens, declares that the *C. lunaris* and *C. victor* of his first volume are one and the same species, which he was led to separate because Fabricius originally described a specimen from which the legs were missing. He plainly states that his new specimens were from the East Indies, yet Bosc, re-naming the species *Matuta appendiculata*, with a reference to "Herbst. Canc. tab. 48, fig. 5" (by error for fig. 6), says "On ignore son pays natal." Milne-Edwards on the other hand, while making Herbst's earlier *C. lunaris* a synonym of *Matuta victor*, assigns the name *Matuta lunaris* to the object of Herbst's later figure and description. In this latter respect he is followed by Miers, neither author taking any account of Forskäl; but Herbst's second *lunaris* will be a preoccupied name, if the species really be distinct either from Forskäl's species or from Herbst's own first *lunaris*. In 1817 Leach, Zool. Miscell., Vol. III., distinguished four species of *Matuta* as *lunaris*, *peronii*, *lesueurii*, and *banksii*, suppressing the name *victor*, as Rüppell explains, on account of its vagueness. A similar vagueness has since been charged against Leach's own marks of discrimination. But in 1830 Rüppell adopted the name "Matuta Lessueri (Leach)" for a Red Sea form, which did not exactly agree with any of Leach's descriptions, although Rüppell says, "It is tolerably near to his M. Lessueri; but it is unmistakably that species which Forskäl described, p. 91, no. 44." Krauss

found Rüppell's species common in the bay of Natal, and at low tide on sand banks at the mouth of the Umlaas. In calling it *M. victor* he follows de Haan, whom he praises for uniting the known forms of *Matuta* into one species, divisible into six varieties. The same name, Miers says, was adopted by Alphonse Milne-Edwards in 1874 for "all the species of earlier authors, every intermediate degree being found between forms which at first might appear distinct." Miers himself, instead of tamely yielding to such a blessed simplification, three years later allotted to the genus nine species, five of which are brand new. He made *victor*, *peronii*, *lesueurii*, and doubtfully Latreille's *doryphora*, synonyms of his own *M. victrix*, to which he gave Herbst's first *lunaris* as a variety *crebrepunctata*, encouraging it with the hope of rising some day to the status of a distinct species. For Leach's *C. lunaris* he accepted the name *Matuta picta*, Hess, with *M. planipes*, Desmarest (not Fabricius), as an additional synonym. As already mentioned he retained Herbst's second *lunaris* as an independent species under that name, and to this he attached no synonyms. In 1886, however, under the influence of Hilgendorf and de Man, his views of the genus exhibit a considerable change. He had in the meantime withdrawn his identification of Herbst's second *lunaris* in favour of another new species, *M. laevidactyla*, and established a species *M. inermis*, which is really very distinct in appearance from all those previously known. Unfortunately, in his latest recension he does not definitely say whether his *M. lunaris* (Herbst) refers to Herbst's earlier or later account, or to both those accounts. But he identifies it with "*Matuta planipes*, Fabricius (fide Hilgendorf)," a species which was published after Herbst's first, but before his second *lunaris*. From his *M. victrix*, var. *crebrepunctata*, Miers withdraws the reference which he had earlier made to the description and figure given by Herbst in 1783 (not 1790, as stated by Miers).

From the interminable discussion of minute differences, as to the importance of which distinguished authors neither agree one with another nor always with themselves, it seems safe to conclude that most of the specific names which have been coined for this genus may be dispensed with. In that case the name *lunaris* given by Forskäl has evident priority. In any case the opinion of Rüppell that the species which he took in the Red Sea is identical with that which Forskäl took in the same sea appears well grounded, and that Krauss was justified in identifying his crabs from Natal with Rüppell's species, need not be doubted.

Of three specimens preserved dry from the Durban Museum, the largest measured 49 mm. between the lateral spikes of the carapace, by a length of 47 mm. The spike on the left side measured 14·5 mm., that on the right was imperfect. A second specimen, also a male, was only slightly smaller. The third, a female, measured 42·5 mm. between the spikes, with a total breadth of 63 mm., by a length of 40 mm. The transversely-grooved ridge or milling, as Alcock appropriately calls it, on the outer surface of the movable finger, so conspicuous a feature in the male chela, is entirely wanting in the female specimen. The two obliquely-grooved ridges or stridulating areas on the inner side of the palm are common to both sexes, the external surface of the hand being also nearly the same in both.

For two specimens of the same species, male, from Borneo, I am indebted to Dr. Charles Hose, D.Sc., and for a female specimen from Singapore, to my nephew, Mr. C. J. Saunders.

I had completed the above discussion before remembering that Alcock had subjected the genus to a most elaborate revision, with the result that he acknowledges five species, *M. inermis*, Miers; *M. banksii*, Leach; *M. miersii*, Henderson; *M. victor*, Fabricius; and *M. lunaris*, Herbst, with a reserve in favour of *M. planipes*, Fabricius, in case Hilgendorf's identification applies only to Herbst's second *lunaris*, and not also to his first. That the South African specimens agree with Alcock's description of *M. victor* is clear, but neither under that heading nor any other does Alcock happen to mention either Forskäl's *Cancer lunaris* or Rüppell's *Matuta Lessueri*. From Forskäl's description it may be worth quoting two of the characters, "frontis lobis tribus, medio marginato," and, following an account of the chelæ, "pedum reliquorum omnium plantae et carpi flavi, compresso-dilatati (sic enim commodius remigat animal)." Whatever may be thought of the claims of Leach's *M. banksii* and Henderson's *M. miersii*, to specific distinction, I think it certain that the species recognised by Hilgendorf, Alcock and others, as *M. victor*, Fabr., ought to be called *M. lunaris* (Forskäl), and that under no circumstances can Herbst's name be used as author of a valid *M. lunaris* distinct from Forskäl's.

BRACHYURA ANOMALA.

1900. *Brachyura anomala*, Stebbing, South African Crustacea, Pt. 1, p. 22.

1902. *Brachyura anomala*, Stebbing, South African Crustacea, Pt. 2, p. 18.

It may be recalled that in Alcock's classification this division includes two tribes, the Dromiidea and Homolidea, the Dromiidea comprising three families, Homolodromiidae, Dromiidae, and Dynomenidae.

Tribe DROMIIDEA.

Fam. **Dynomenidae.**

1892. *Dynomenidae*, Ortmann, Zool. Jahrb., Vol. VI., p. 541.
1898. *Dynomenidae*, Ortmann, in Bronn's Thierreich, Vol. V, Pt. 2, p. 1155.
1899. *Dynomenidae*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVIII., Pt. 2, pp. 123, 127.
1899. *Dynomeninae*, A. M.-Edw. and Bouvier, Crust. Decap. de l'Hirondelle, fasc. 13, p. 9.
1901. *Dynomenidae*, Alcock, Catal. Indian Decap. Crust., Pt. 1, pp. 31, 34, 74.

To distinguish this family from the other two Alcock gives the following marks :—" Only the last pair of legs reduced in size and subdorsal. Lateral borders of carapace well defined. The appendages of the sixth abdominal somite are represented as in the *Dromidae*. Epipodites are present on the chelipeds and next two pairs of legs. According to A. Milne-Edwards and Bouvier the gill plumes are 20 on either side."

Gen. **Dynomene,** Latreille.

1825. *Dynomene*, Latreille, in Desmarest, Consid. gén. Crust., pp. 133 (footnote), 442.
1829. *Dynomene*, Latreille, Règne Animal, éd. 2, Vol. IV., p. 69.
1901. *Dynomene*, Alcock, Catal. Indian Decap. Crust., Pt. 1, pp. 34, 74.

In the work referred to Alcock supplies a full synonymy for the six species known to him at that time, namely, *D. hispida*, Desmarest ; *D. ursula*, Stimpson ; *D. praedator*, A. Milne-Edwards ; *D. pugnatrix*, de Man ; *D. filholi*, Bouvier ; and *D. pilumnoides*, Alcock. He distinguishes the only two genera at present included in the family thus :—

> " Carapace flattish, broader than long, pilose—*Dynomene.* Carapace convex, longer than broad, spinose—*Acanthodromia.*"

The species here added to *Dynomene* is therefore distinguished from the other species of that genus, and makes some approach to *Acanthodromia*, by the fact that its carapace is by no means flattish.

Dynomene platyarthrodes, n.sp.

Plate XVII.

Almost the whole exterior of this species presents a coating, more or less dense, of peculiar club-shaped setae. The inflated distal part of these varies much in thickness, and the length of the pedicel is sometimes considerable, but sometimes so evanescent that there is nothing apparent but a little globular wart. In marginal fringes plumose setae are mingled with the others.

The broadly triangular front is very strongly deflexed. It has a tubercle on its tip, and a not very conspicuous elevation at each side, between which and the upper orbital tooth there is formed a cavity. From the tooth the orbit curves round to a small tooth on the lower side, a large interval between this and the front being filled by the first and second antennae. The very prominent and inflated gastric region appears to be continuous with the cardiac, but separated by a depression from the intestinal region. It is longitudinally grooved. Wide and deep depressions separate the median inflation from the inflated hepatic regions, which are themselves separated by a sulcus from the less swollen branchial areas. In contrast with the dorsal surface the under surface of the carapace is flattened, an irregularly-toothed ridge line running from the outermost tooth of the endostome at first transversely, then curving round and losing itself before reaching the branchial sulcus. The sternal sulci of the female, starting from between the bases of the fourth and fifth legs, almost meet on a slight elevation far up between the chelipeds.

The pleon of the ovigerous female is trilobed, very strongly curved, bulging so as to exhibit the first three segments in a dorsal view. The telson, which is flatter than the preceding segments, is considerably broader than long, its apex angled but not produced.

The eyes in the dried specimen are dark reddish-brown, the pedicels not elongate. The first antennae have an irregularly quadri-lateral first joint, distally widened, the two following joints comparatively smooth and cylindrical. The second antennae have the basal joint mimicking as usual a little chela with immovable fingers; the second joint, as in *Dynomene filholi*, Bouvier, is marked by the large lobe at the outer angle; the two following joints are small; the flagellum reaches a little beyond the orbit. In the second maxillipeds the sixth and seventh joints are notably broader than the fifth. In the third maxillipeds, the third joint has a very thick, longitudinal brush of setæ, and external to this the masticatory edge, bordered with a dozen spaced little horny tubercles.

The legs are not elongate, successively smaller, all more or less flattened, and (except the last pair) three-sided, the chelipeds with two sharp edges, the three following pairs with three sharp edges to several of the joints. The fingers of the chelipeds are broad, closing tightly together, with the teeth few and broad —not acute.

In the fourth legs the small sixth joint has a spine at the apex, with which the small, curved finger can antagonise. The fifth legs alone are sub-dorsal. They are very slight, the fifth and sixth joints much narrower than the fourth, the finger minute.

The small plates, representing the uropods, attached to the sixth pleon segment are not concealed, except in so far as they are covered by a mass of clubbed setæ. They are somewhat pod-shaped, and not very rigidly fixed.

The carapace measures 21 mm. in length, by a breadth of 26 mm.

Locality.—Cape Point, N.E. by E., 36 miles. Depth, 650–700 fms.

The specific name refers to the broad flattened surfaces exhibited by the limb joints.

The single female specimen, having become dry through the breakage of a bottle in transit, a complete examination was not feasible. Nevertheless, the points of agreement with *Dynomene filholi* in regard to the adornment and the character of the front, the orbits, and antennae, encourage me to believe that the genus is correctly assigned.

Fam. **Dromiidae.**

1902. *Dromiidae*, Stebbing, South African Crustacea, Pt. 2, p. 49.
1902. *Dromiidae*, Fulton and Grant, Proc. Royal Society of Victoria, Ser. 2, Vol. XIV., Pt. 2, p. 57, Vol. XV., Pt. 1, p. 61.
1903. *Dromiidae*, Borradaile, Ann. Nat. Hist., ser. 7, Vol. XI., p. 297.
1903. *Dromiidae*, Borradaile, in Gardiner's Fauna and Geog. Maldive and Laccadive Archipelagoes Vol. I., Pt. 4, p. 427 ; Vol. II., Pt. 1, p. 576.

To the genera of this family mentioned in the second part of this report, Fulton and Grant in 1902 add the genus *Platydromia*, with flattened, sub-pentagonal carapace, bilobed front, last pair of legs as long as the chelipeds, and the sternal sulci of the female ending apically without meeting between

the first pair of legs, but terminated by a pair of curved ridges which do meet. Whether by the first pair of legs the chelipeds are intended, or the first ambulatory legs, is rather uncertain, the obscurity not being elucidated by the figure of the sternum. In 1903 Borradaile, in his tabular view of the *Dromiidae*, upholds against Alcock the generic distinctness of Stimpson's *Dromidia* and his own *Dromidiopsis*, adding two new genera, *Cryptodromiopsis*, in which the sternal sulci end together on the cheliped segment, and *Dromides*, in which they end apart. With *Platydromia* Borradaile was at the time of writing insufficiently acquainted. He proposes a genealogical tree of the family, but speaks of it in conclusion as "a good example of that kaleidoscopic shuffling of characters which so often meets the student of zoological genealogy."

Gen. **Dromia**, Fabricius.

1798. *Dromia*, Fabricius, Supplementum Ent. Syst., p. 359.
1899. *Dromia*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVIII., Pt. 2, p. 136.
1901. *Dromia*, Alcock, Catal. Indian Decapod Crustacea, Brachyura primigenia, p. 43.
1903. *Dromia*, Borradaile, Ann. Nat. Hist., Ser. 7, Vol. XI., p. 298.

Many other references are supplied by Alcock. The genus is defined by Borradaile as follows :—

"Dromiidae with an epipodite on the cheliped, the walking-legs not knobbed or ridged, the carapace broader than long, the regions well marked or indistinct, the ridges of the efferent branchial channels broken, indistinct or well made, the sternal grooves of the female ending apart behind the cheliped segment, the fifth leg shorter than the third, and with no thorn on the outer side of its last joint."

He assigns to it "*D. vulgaris*, *D. dormia* (= *D. Rumphi*), etc.," thus leaving in the genus only one of the three Indian species included in it by Alcock, but transferring *D. cranioides*, de Man, to *Dromidiopsis*, and *D. unidentata*, Rüppell, to *Dromidia*, Stimpson.

Dromia dormia (Linn.).

1763. *Cancer dormia*, Linn. Amoen. Acad., Vol. VI., p. 413.
1781. *Cancer dromia*, Fabricius, Species Insectorum, Vol. I., p. 501.

1790. *Cancer dormitator*, Herbst, Krabben und Krebse, Pt. 8, Vol. I., p. 250, Pl. 18, fig. 103.
1798. *Dromia Rumphii*, Fabricius, Supplementum Ent. Syst., p. 359.
1839. *Dromia Rumphii*, de Haan, Crustacea Japonica, decas quarta, pp. 105, 107, Pl. 32 and Pl. H.
1877. *Dromia Rumphii*, Targioni Tozzetti, Crost. Brachiuri e Anomouri della Magenta, p. 207.
1899. *Dromia Rumphii*, Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVIII., Pt. 2, p. 137.
1901. *Dromia Rumphii*, Alcock, Catal. Indian Decapod Crustacea, p. 44, Pl. 2, fig. 4.
1903. *Dromia dormia*, Borradaile, Ann. Nat. Hist., Ser. 7, Vol. XI., p. 298.

Several other references are supplied by Alcock, with whose description our specimen well agrees. The very convex tomentose carapace shows plainly the branchial or "second cervical" groove, and less distinctly the outlines of the cardiac region. The front is tridentate, the lower median tooth, however, being the least conspicuous, not as in Alcock's account "slightly the most prominent."

The chelipeds have two conspicuous nodules on the wrist, the fingers apically bare and flesh-coloured with some reminiscence of rose tint, their clasping teeth stronger than represented in any of the figures above cited. The presence of an epipod on these limbs could not be ascertained in the long-dried specimen.

The fingers of the second and third legs are bare above, the thick felt of setules forming two divergent crests on either side, a feature to which de Haan and Tozzetti have both called attention. The fourth and fifth legs are very short.

The sternal sulci of the female are apically divergent, and reach very nearly to the segment of the chelipeds.

Length of carapace, 44 mm.; greatest breadth, 52 mm.

One specimen, from Durban Museum; place of origin, Natal Bay.

Gen. **Dromidia**, Stimpson.

1858. *Dromidia*, Stimpson, Proc. Ac. Sci. Philad., p. 225 (Prodromus, p. 63).
1888. *Dromidia*, Henderson, Challenger Anomura, Reports, Vol. XXVII., p. 12.
1898. *Dromidia*, Ortmann, Bronn's Thierreich, Vol. V., Lieferung 52, p. 1155.

1899. *Dromidia* (sub-genus), Alcock, Journ. Asiat. Soc. Bengal, Vol. LXVIII., Pt. 2, p. 140.
1900. *Dromidia*, Young, West Indian Stalk-eyed Crustacea, p. 334.
1903. *Dromidia*, Borradaile, Ann. Nat. Hist., Ser. 7, Vol. XI., p. 299.

As will be seen from the discussion of it under the new genus *Exodromidia*, Stimpson's genus *Dromidia* is still involved in much obscurity. The character that the sternal grooves of the female are produced to the segment of the chelipeds will not apply to Studer's species D. *bicornis*, but as there is only a young example of a single sex of that species here available, it is not an appropriate occasion for dealing with the intricacies of this particular genus.

Dromidia (?) bicornis, Studer.

1883. *Dromidia bicornis*, Studer, Crustacea of the Gazelle, Abhandl. K. Akad. Berlin, 1882, p. 20, Pl. 1, figs. 9A, 9B.
1888. *Dromidia bicornis*, Henderson, Challenger Anomura, Reports, Vol. XXVII., p. 13.

A very small specimen effectively displays many of the characters assigned by Studer to this species. It has the narrow rostrum bent almost directly downwards, appropriate to the female. On either side of it the two great horns, slightly unequal, each armed with a tooth and various setæ, are directed upward, outward, and a little forward. The orbital margins are ornamented with fine denticles, several of which are visible also on the antero-lateral margins. The convex dorsal surface of the carapace is smooth behind beneath the coating of down and interspersed longer hairs, but in front has some little raised denticular points. The corners of the buccal frame are grooved, with denticles on either side of the grooves. The fourth joint of the third maxillipeds is denticulate on its outer, inner, and front margins. All the limbs have numerous protruding denticles as well as hairs in abundance. The fingers of the second and third legs have small spines along the concave margin. The short third legs have a chela formed by the strongly curved finger, and a strong spine projecting from the sixth joint. The fifth legs are simple, a little longer than the fourth.

The specimen shows no furrows, but two oblique little slit-like dark marks, wide apart, converging forward, in the sternum between the second pair of legs. Studer says, "The female

sexual openings debouch in a projecting papilla between the bases of the first ambulatory legs." Henderson makes no remark upon this statement, which would give the species so exceptional a position. In the female specimen here under consideration the genital openings are placed according to rule in the basal joint of the third legs, the second ambulatory pair. It must be taken for granted that Studer was misled by the appearance of the sternum, and therefore did not look for the true genital openings. In the present specimen there is no papilla on the sternum, and what appear delusively as genital openings are widely separated. But these differences from Studer's description may be due to immaturity. The very small first pleopods and the much larger four following pairs do not seem to have attained their full development. The rudimentary plates of the sixth pleon segment are exceedingly small, not visible dorsally. The telson is apically acute.

The carapace is 6 mm. long in the median line, and may be taken to be at least of equal breadth. Studer gives the length as 16 mm. and the breadth as 15 mm., without saying whether the measurements apply to both sexes alike or only to one of them.

Locality.—Vasco de Gama Point, S.75 E., 13½ miles; depth, 166 fathoms.

Gen. **Exodromidia**, n.

Carapace with large tubercles, not narrow. Sternal sulci of female strongly convergent, narrowly separated at the apices just behind the chelipeds. Chelipeds without epipod, much larger in male than in female. Fourth and fifth legs very small, the finger opposed to a spine projecting from the preceding joint. Sixth pleon segment with vestigial appendages concealed, the third, fourth and fifth segments in the male being similarly furnished.

The genus is founded for a species removed from *Dromidia*, and to this circumstance its name refers.

In Stimpson's definition of *Dromidia*, the sternal sulci of the female are produced to the segment of the chelipeds; the sixth pleon segment has appendages, though they are said to be minute, concealed; the legs are like those of *Dromia*. *Dromia hirsutissima*, Lamarck, is given as the type. But of this, unfortunately, so little is known that Mr. Borradaile in his revision of the family, cannot decide whether it should be retained in Stimpson's genus or not. He suggests the union of Stimpson's *Pseudodromia* with *Dromidia*, and gives a modified definition, according to which the fifth leg is "longer than

the fourth, as long as or rather shorter than the third," both of which alternatives are alien to the present genus. From *Eudromia*, Henderson, with which *Exodromia* agrees in regard to the fourth and fifth legs, it is separated by having the frontal region tridentate and normal, by the shortness of the chelipeds, and their sexual differentiation, as well as by the strongly-tubercled carapace.

Exodromidia spinosa (Studer).

Plate XVIII.

1883. *Dromidia spinosa*, Studer, Crustacea of the Gazelle, Abhandl. K. Akad., Berlin, 1882, p. 22, Pl. 1, figs. 10, a, b.

Only the female of this species was described by Studer, but his description in almost all respects applies to both sexes. He speaks of the carapace as completely covered with fine down, having among it solitary short setæ. In all our specimens the fine down is absent from many parts of the carapace and limbs. Studer also speaks of the tridentate front as having the middle tooth small, pointed, downward bent, and the side teeth large, three-sided, strongly produced forward. It might be proper to say that the middle tooth is on a lower plane than its larger companions, rather than that it is downward bent, for its direction seems to be horizontal. The outer orbital angle is defined by a very small tooth, with a rather larger one near it on the lower margin. The antero-lateral margin has three forward pointing teeth, of which the middle one is a little the most prominent, and the lowest bounds the branchial (or second cervical) furrow. A row of small denticles commencing on the hind margin of the third tooth is continued some way backward, but is often lost to view among the down and setæ. At the middle of the carapace there is a large transverse tubercle, or in small specimens a simply conical one, probably bounding the gastric region. In front of it there is an inconspicuous tubercle, not mentioned by Studer, and probably not visible when the down is present on that part of the carapace. At some distance on either side of this, but a little to the rear, there is a tubercle on each hepatic region. Within the cardiac region there is a large conical tubercle, and one of about the same size at some distance on either side of it. Finally, on the intestinal region there is a large transverse tubercle or prominence.

The broad pleon of the female is conspicuously trilobed, with the median lobe transversely furrowed between two prominences, of which the anterior one is subacute in all the segments between the first and the telson. The hind margin of the fifth segment extends on each side beyond the front margin of the sixth, which in turn similarly exceeds the width of the telson, the telson itself being much broader than long. The much narrower pleon of the male has the first segment narrowly produced outward at each side, the following segments being raised and transversely furrowed down the centre, much as in the female, but with no raised lateral lobes. The third, fourth, and fifth segments are ventrally produced into a median tooth, and the telson is produced into a still larger acute apical tooth, conspicuous when the surrounding setæ are removed.

The corners of the buccal frame are denticulate, and the hind margin of the epistome has a little median incision. The mandibles are elongate, that on the left having the upper corner of the broad cutting edge rounded, that on the right having this corner bifid. The palp is pellucid in contrast with the porcellanous trunk, its third joint folding down within the cutting edge. The lobes of the lower lip are thick and soft, when in position appearing to be apically pointed. In the first maxillae the narrow second joint of the palp is so twisted that it has the appearance of being formed of three joints. The second maxillae are slight in texture, the lobes except the lowest, narrow, the exopod pointed at the lower corner. The first maxillipeds have the epipod broad at the base and apically very narrow, as figured by Boas for *Dromia*, but the basal joint of the exopod, instead of being at least as long as the adjoining twisted and apically-pointed lobe, is so much shorter that the linear six-jointed terminal piece does not make up the deficiency. In the second maxilliped the last three joints stand at right angles to the long fourth joint, and are all short and broad, rather strongly spined distally. The third maxillipeds have the first joint very short but broad, its outer half showing four lobes, between the two outermost of which is attached an irregularly narrow epipod; the second joint triangular, small, the third with inner margin less closely denticulate than in *Dromia*, the fourth apically truncate but strongly excavate at the inner angle, the socket for the fifth joint being enlarged by a strongly projecting blunt tooth at the top of the inner margin. For following these characters the maxilliped must be viewed from its dorsal surface.

The chelipeds are very slightly tuberculated, the most conspicuous tubercles being two on the distal border of the wrist. The hands widen to the base of the thumb and finger,

the latter being considerably the longer of the two in the male, with nine teeth along its outer margin, and one on the inner; while the thumb has eight on the outer and one on the inner. The apical tooth of the finger fits in between the apical pair of the thumb. In the female, except for the three distal teeth, the denticulation of finger and thumb is fairly marked. In the largest male the upper margin of the hand measured 24 mm., the lower including the thumb, 34 mm. In the female with eggs, the corresponding measurements were 8 mm., and 12 mm. The second and third legs in the female are not much shorter than the chelipeds, but in the male they fall far below the chelipeds both in length and thickness. They are moderately hirsute with feathered setæ, but with a bare spot on the under surface of the fourth and fifth joints. The rather long fingers have spines along the inner margin, alternating in size. The fourth and fifth legs are tiny in comparison with the two preceding pairs, but with longer plumose setæ. The fourth leg is a little shorter and more robust than the fifth, its fourth joint wider at the base than distally. In both pairs the seventh joint is small, curved at the tip, and antagonising with a strong spine from the apex of the preceding joint. The vasa deferentia issuing from the first joint of the fifth legs in a dissected specimen measured 4 mm., the fifth and sixth joints together measuring 5 mm.

In the female the first pleopods are short, the four following pairs elongate. In the male the first pair are tied together ventrally at the first joint, which is coalesced with the segment; the second joint, as broad as the first, has a much larger brush of plumose setæ, with which also the two sub-equal one-jointed rami are densely furnished distally. The second pleopods, sheltered in grooves of the first, are of much slighter structure, the first joint elongate, coalesced with the segment; the second not much longer than broad, the ramus produced to a point at each corner, the inner process much the longer, with a long spiniform termination. The third, fourth and fifth segments are provided each with a pair of very small oval plates, no doubt rudimentary, and apparently functionless pleopods. The sixth segment has also a pair of plates, which are larger and placed transversely instead of longitudinally. They are quite concealed in a dorsal view, and ventrally are hidden by plumose setæ.

The colour, judging by slight remains of it at various points, is a marbled red and white, beneath the fur or perhaps chiefly at points where the fur is scantiest.

The carapace of the largest male specimen measured 29 mm. in length by 32 mm. in breadth. The carapace of the female measured 20 by 20 mm., exactly the dimensions given by Studer.

Locality.—Cape Point, N.E. by E. ¾ E., 8 miles; depth, 91 fathoms. Bottom, sand and specks. The "Gazelle" specimen was taken in 117 fathoms to the south of the Cape.

In Studer's opinion this species belongs to a group containing *Dromidia unidentata* (Rüppell) and *D. rotunda* (McLeay). With *D. unidentata* there are no doubt some points of resemblance, but that species has a smooth carapace, with the lateral borders almost entire; the chelipeds appear to be similar in the two sexes, and the fifth legs are said to be very much longer than the fourth, and not so very much shorter than the second and third; so that it will not at all suit the definition of *Exodromia*.

In their work on the Brachyura and Anomura of the "Travailleur" and "Talisman" A. Milne-Edwards and Bouvier redescribe and figure Bouvier's *Dynomene Filholi*. They say of this species, "The sexual pleopods of the male still bear much resemblance to those of the Homariens, those of the second pair are filiform at the extremity and furnished at their base with a very distinct exopodite. The following three pairs of pleopods are still present at all periods of life; they are biramose and show especially a great relative development in the individuals of medium size, which form almost all the gathering made by the "Talisman." *D. Filholi* appears to be, so far, the only Dromiacean which presents this character; from this point of view it has remarkably preserved the characters of the larvae, and makes a great approximation to the Homariens" (Op. cit. p. 8, 1900).

It now appears, therefore, that the Dromiidae have an additional link of connection with the Dynomenidae. It should, however, be remembered that the details of structure in these male pleopods differ considerably. According to Alcock, the rudimentary pleopods of segments 3–5 are not found in any known Indian species of *Dynomene*.

MACRURA ANOMALA.

Section LITHODINEA.

Fam. **Lithodidae.**

In the Proc. Zool. Soc. London for 1900, pp. 529–532, the principal bibliographical references required for a study of this family have been given. For the present purpose it may be

useful to quote again the characters used by Professor E. L. Bouvier for distinguishing the Ostracogastrica from the Hapalogastrica, the other division of the Lithodinea. The Ostracogastrica in general have the "lateral pieces of the pleon absolutely entire; acicle spinulose or spinose, rarely laminar, simple, sometimes rudimentary." The genus *Phyllolithodes*, Brandt, is, however, an exception, having some affinities with the other tribe, a point which I misunderstood in my previous quotation from Professor Bouvier's memoir (Ann. Sci. Nat., Ser. 8, Vol. I., p. 20, 1896).

The genus *Lithodes* was instituted by Latreille in his Genera Crustaceorum et Insectorum, Vol. I., p. 39, 1806. Scudder in his Nomenclator, and Henderson in his report on the Challenger Anomura refer to the date 1802, as given by Agassiz for the institution of the genus. In his Hist. Nat. des Crustacés, Vol. I., p. 247, 1802, Bosc quotes Latreille as expressing an opinion that a new genus might perhaps be required for the species on which *Lithodes* was eventually founded. This opinion was probably given by word of mouth. No generic name is suggested either in Bosc or in Latreille's own work, Hist. Nat. Crust. et Ins., Vol. VI., 1803, where the subject is left in great confusion.

Gen. **Neolithodes**, Milne-Edwards and Bouvier.

1894. *Neolithodes*, A. M.-Edw. and Bouvier, Bull. Soc. Zool. France, Vol. XIX., p. 121.
1894. *Neolithodes*, A. M.-Edw. and Bouvier, Brachyures et Anomoures de l'Hirondelle, fasc. 7, p. 91.
1895. *Neolithodes*, Bouvier, Ann. Sci. Nat., Ser. 7. Vol. XVIII., p. 177.
1896. *Neolithodes*, Bouvier, Ann. Sci. Nat., Ser 8, Vol. I., pp. 8, 20, 22.
1898. *Neolithodes*, Ortmann, in Bronn's Thierreich, Vol. V., Lieferung 51, p. 1148.

As a character common to this genus and *Paralithodes*, Brandt, Professor Bouvier states that "the five pieces of the second pleon-segment are contiguous, but separated by distinct sutures." He notices that according to Smith there are only three pieces in the second segment of *Neolithodes Agassizi*, but suggests that "the author has probably not taken account of the marginal pieces." Nevertheless, in the South African specimens I cannot find more than two distinct sutures in the second segment, the lateral pair having a very indefinite appearance.

For distinguishing *Neolithodes* from *Paralithodes*, the following characters are assigned by Bouvier :—" The pleon-segments 3–5 are covered with calcified nodules, of which some are soldered together, in the adult, to form some small lateral pieces separate in the male, and three pieces situated to the left in the female. Rostrum simple, sharp, starting from between a pair of basal spines. Acicle rudimentary in the known species, except in some abnormal individuals."

The three species hitherto comprised in the genus are *N. agassizii* (S. I. Smith), 1882, in which the carapace has spinules interspersed among the spines, and the walking legs are flattened, with small spines on the third joint ; *N. grimaldii*, A. M.-Edw. and Bouvier, 1894 (including *Lithodes goodei*, Benedict, 1894), in which the spines on the carapace are fewer and not interspersed with spinules ; *N. diomedeae* (Benedict), which agrees with *N. grimaldii* in the carapace, but is distinguished from both the other species by having a very long spine on the third joint and spines on the first joint of the walking legs.

Neolithodes capensis, n. sp.

Plates XIX., XX.

This species is akin to *Neolithodes agassizii* (S. I. Smith), having spinules among the numerous spines on the carapace, the walking legs flattened, their third joint without any very large spine, and their first joint with a dentation of the distal margin that is only here and there feebly spine-like. In other respects, however, it does not seem possible to reconcile the armature of the walking-legs in the South African specimens with that described by Professor Smith. It is true that in this genus the spines show an extraordinary amount of variation at different stages of the animal's life, and are by no means constant from specimen to specimen, but it so happens that one of those at our disposal agrees in sex and size so nearly with the two examined by the learned American author that the marked differences in detail may well be considered specific.

The carapace of the female measures 148 mm. from the apex of the rostrum to the hind margin, not including the long spines projecting beyond that margin on either side of the middle line ; its breadth between the apices of the branchial spines is 116 mm. The rostrum ventrally is 30 mm. long, dorsally to the point of junction with the lateral spines 24 mm. Of these one measures 20 mm., the other slightly less. On the inflated gastric region there is a hexagonal arrangement of six prominent spines, with

several minute scattered spinules in the centre and a triangle of spinules above and another below, in each case the apex pointing backward. The sharply-marked cardiac region has two successive pairs of prominent spines, followed by a solitary one. A sharp spine marks the outer angle of the orbit. To this succeed, bordering the hepatic region, a moderate, a very small, and a large spine. At the cervical groove the carapace is angled inwards, widening greatly at the branchial regions, with eleven very unequal spines running round the margin on either side, seven large spines interspersed with some small spines and various spinules surmounting the space occupied by each branchial region in combination with half of the intestinal region, the longest spines apart from the rostral being on the rear half of the carapace. The hind margin is fringed with several little nodules besides two or three pairs of spinules. The second segment of the pleon has a dozen spines on the centre compartment, with a somewhat larger number on the left, and a smaller number on the right hand compartment. The left hand plates of the next three segments are prickly with spines, and so much widened that they drive the small sixth and seventh segments to lie along the base of the first walking-leg on the right. The narrow, distorted remainder of the three middle segments presents a close mass of nodular spines, of which the largest are turned outwards to the right. The sixth segment carries a few small spines and spinules.

The eye-stalks are slightly spinulose, short, reaching little beyond the external orbital spine. The eyes are dark, the cornea ventrally situated. The inner antennae do not reach much beyond the rostrum. The second joint is on the outer side produced into a spine which reaches beyond the penultimate joint of the peduncle in the outer antennae, this joint having a short apical upward-pointing spine on the right antenna, but not on the left. The stouter right cheliped measured 191 mm. in length, the hand being 79 mm. long, with a greatest breadth at the base of the finger of 30 mm. The finger, which does not quite reach the extremity of the thumb, is 40 mm. long. The left cheliped, 195 mm. long, has a hand 73 mm. in length, 22 in greatest breadth, the finger 42 mm. long. The finger and thumb in the right chela are bordered within till near the apex with long nodules of ivory white. These are not found on the smaller chela, in which the finger has much of the edge straight and sharp, while the thumb has distally a series of low teeth, not pointed but broad. On the ventral surface the chelipeds have only small spines or spinules, the largest being placed distally on the third joint. In dorsal view the fourth joint shows two large spines on the distal margin, and a sub-apical

one on the inner margin. There are only a few spines and spinules along the surface. The fifth joint carries seven or eight good-sized spines interspersed with as many small ones in no very regular order. The hand has three or four sparse, irregular lines of small spines; and the thumb and fingers have a roughened surface, with numerous small tufts of short hairs.

The second, third and fourth pairs of legs are very nearly alike, the fourth being slightly the longest, and measuring 350 mm., of these 14 inches the last four joints occupying respectively $4\frac{1}{3}$, $2\frac{1}{5}$, 4, $1\frac{1}{5}$ inches. On the third joint the longest spine measures only 5 mm. in contrast with the distal spine of the fifth joint, which is 19 mm. long. In regard to *N. diomedeae*, Benedict writes:—"The ambulatory feet have a few spines 12 mm. in length, on the carpal and propodal segments; one of the largest spines of the ambulatory feet projects from the ischium [third joint]." The spines on the lower distal margin of the first joint vary, he says, from 8 to 11 mm. in length. In the present specimen the most conspicuous spines are the proximal and distal on the fifth joint, and two or three of those on the fourth joint, one distal, one median, one on the inner margin. But the last two are less important on the second and third limbs than on the fourth. The lower surfaces of these limbs are smooth to the eye, but rough to the touch.

The small, infolded fifth legs are quite free from the sternal plastron, and so situated in regard to the pleon that the rudimentary first pair of pleopods in the female might pass for epipods of these limbs. The minute chela is surrounded by a bush of setæ.

The four pleopods found only on the left side of the second, third, fourth and fifth pleon segments have the peduncle distally much widened, both that and the one-jointed ramus being setose.

The male differs very little from the female except in the ordinary sexual characters. The length of the carapace is 132 mm., somewhat less than that of the female, which in breadth it just equals. The rostral spines are rather shorter, even with allowance for the slightly imperfect tip of the central horn. There is a well-developed spine in the centre of the six that form a hexagon on the gastric region. This is wanting in the female, but in general the spines of the male are less powerful. In both sexes it may be noted that paired spines are not always quite symmetrical in size or position. The hand of the right cheliped is 86 mm. long and 31 mm. in greatest breadth. The fourth peracopod measures 360 mm. The distal spine of the fourth joint is only 11 mm. in length.

Locality.—Cape Point, N. 70° E., 40 miles ; depth, about 800 fathoms ; bottom, green mud.

The specific name refers to the place of capture.

At a neighbouring station, " Cape Point, E. ¾ N., 38 miles ; depth, 630 fathoms ; bottom, green mud," a small *Neolithodes* was obtained, which, to judge by the budding pleopods, is evidently a young female. In this the spines on the carapace are in general much longer, and the spines along the legs are very much more numerous. The telson is still pointing between the chelipeds, although the pleon has commenced its outgrowth towards the left. There is little doubt that this handsome little specimen is a young form of the species here described. From the young specimens of *N. grimaldii*, as shown in various figures, it differs greatly in the very numerous spines on the ambulatory legs. At some future opportunity I shall hope to describe this form in more detail, but reserve such description for the present, in the hope of having eventually specimens of intermediate size for comparison.

MACRURA GENUINA.

Fam. **Penaeidae.**

1852. *Penaeidae* (part), Dana, U.S. Expl. Exp., Vol. XIII., p. 600.
1893. *Penaeidae*, Stebbing, History of Crustacea, p. 213.
1898. *Penaeidae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1118.
1900. *Penaeidae*, Holmes, California Acad. Sci., Occasional Papers, No. 7, p. 217.
1901. *Peneidae* (Subfam. *Peneinae*), Alcock, Catal. Indian Macrura, pp. 11, 13.
1901. *Penaeidae*, M. J. Rathbun, Bull. U.S. Fish. Comm., Vol. II., p. 100.
1902. *Penaeidae*, M. J. Rathbun, Proc. Washington Ac. Sci., Vol. IV., p. 287.
1902. *Penaeidae*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXVI., p. 37.
1902. *Penaeidae*, Nobili, Bull. Mus. d'Hist. Nat., No. 5, p. 229.

Various other references will be found in connection with the genus and the synonymy of the following species. Alcock divides the family into three sub-families, Peneinae, Aristaeinae, Sicyoninae, defining the first as follows :—" A long setose leaf-like appendage, acting as a sort of protection to the eye, is present on the inner border of the basal joint of the antennular

peduncle. Exopodites are present on the second maxillipeds, and usually also on the third ; they are usually present on the thoracic legs, but are sometimes absent from some or all of them. Podobranchiae are never present on the thoracic legs (only in some species of *Haliporus* is there a rudimentary podobranch on the first pair). Arthrobranchiae in a double series."

Gen. **Penaeus,** Fabricius.

1798. *Penaeus*, Fabricius. Supplementum Ent. Syst., p. 408.
1900. *Penaeus*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXII., p. 310.
1901. *Peneus*, Alcock, Catal. Indian Macrura, p. 13.

The genus has been divided into several subgenera, but the material here handled does not lend itself to a discussion of the characters by which these sub-divisions are distinguished.

Penaeus monodon, Fabricius.

1798. *Penaeus monodon*, Fabricius, Supplementum Ent. Syst., p. 408.
1803. *Penaeus monodon*, Latreille, Hist. Nat. Crust. et Ins., Vol. VI., pp. 246, 249.
1837. *Penaeus monodon*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 416.
1843. *Penaeus monodon*, Krauss, Südafrik. Crust., p. 55.
1849. *Penaeus semisulcatus*, de Haan, Crustacea Japonica, decas sexta, p. 190, Pl. 46, fig. 1. (*Penoeus* on plate.)
1852. *Penaeus carinatus*, Dana, U.S. Expl. Exp., Vol. XIII., p. 602, Pl. 40, fig. 2.
1881. *Penaeus monodon*, Bate, Ann. Nat. Hist., Ser. 5, Vol. VIII., p. 178, Pl. 12, fig. 5 *vp* (*up* on plate).
1888. *Penaeus monodon*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 250, Pl. 34, fig. 1.
1888. *Penaeus semisulcatus*, de Man, Journ. Linn. Soc. London, Vol. XXII., p. 284.
1892. *Penaeus monodon*, de Man, Max Weber's Reise in Niederl. Ost-Indien, Vol. II., p. 513.
1900. *Penaeus monodon*, Kishinouye, Journ. Fisheries Bureau, Tokyo, Vol. VIII., p. 15, Pl. 2, fig. 1, Pl. 7, figs. 3, 3a.

Latreille adds nothing to Fabricius except the suggestion that the species figured in Seba's Thesaurus, Vol. III., Pl. 17, fig.

2, may be the same as *P. monodon*. Desmarest in 1825 mentions the name, but, as Bate has pointed out, no doubt misapprehended the species. Krauss reports it from the coast of Natal. He states that his largest specimens from frontal margin to apex of telson were only three inches five lines long ; the rostrum somewhat longer than the peduncle of the first antennae, with seven teeth above and three below, the hindmost of the upper teeth being situate in the middle of the carapace ; the colour yellowish-green with cross stripes. Miers, Bate, and de Man agree in thinking that *P. semisulcatus* is the same species as *P. monodon*, although the last-named writer still in 1892 retains de Haan's name for the species (Op. cit., p. 510) in the very work in which he decides that Fabricius has the priority. According to de Haan, as Bate notices, the internal flagellum of the first antennae is twice as long as the external. But the figure which de Haan gives in no way supports his statement, since it shows the lower flagellum only a very little longer than the upper one. This is in accord with de Man's statement (op. cit., 1888) that " the flagella of the internal antennae have both nearly the same length, being a little longer than the peduncle, *i.e.*, the distance from the distal end of the terminal joint of the peduncle to the anterior margin of the carapace." He adds that " the upper or external flagellum is a little broad and grooved along the proximal third of its length ; whereas the remaining part, like the other flagellum, is cylindrical." Dana says of his *P. carinatus*, " flagella of inner antennae not longer than two preceding joints," but as he omits these antennae altogether from his figure of the carapace, we cannot be very sure that he knew much about them.

The only mark by which de Haan distinguished his species from *P. monodon* is that in the latter there is no furrow between the base of the rostrum and the hind margin of the carapace, whereas in *P. semisulcatus* there is such a furrow. Upon which Bate observes that of (two) specimens, " taken in the same haul, the female has a median groove, but in the male there is none, the dorsal carina being entire." In a male eight inches long, and a female seven inches long, both sent me from Borneo by Dr. Charles Hose, behind the hindmost tooth on the carapace the carina is sulcate, but more firmly in the female than in the male. On the other hand, in a female seven and a half inches long, from the Durban Museum, and in a female seven inches long from " near Port Elizabeth, Zwartskop River," the carina has a flat-topped appearance such as one might fancy would arise from the wearing down of the edges to a shallow sulcus.

The Port Elizabeth specimen has eight teeth on the rostral crest and is abnormal in having only two on the lower edge, the foremost just under the foremost of the upper teeth, and the penultimate a little in advance of the penultimate upper tooth. In the Durban Museum specimen the upper teeth are only six in number, a seventh, the foremost, being represented only by a depression of the margin. The three lower teeth are all in advance of the foremost of the fully-developed upper teeth. Bate says of these lower teeth, "According to de Haan's figure they are situated, or at least two of them, posterior to the most anterior tooth on the upper margin, whereas in our specimens of *Penaeus monodon*, they are all in advance of that position." It is true that in de Haan's figure only one of the lower teeth is in advance of the foremost upper one, but in Bate's own figure the case is almost exactly the same, only that the foremost upper tooth being poorly developed, the middle lower tooth is a little in advance of it instead of a little behind. It is tolerably certain that considerable variation occurs in these details. The apex of the rostrum admits of some upward curvature, whereas Bate describes the whole rostrum as straight. In his figure also the two flagella of the first antennae are not nearly as long as the peduncle, so far making an approach to the proportion which Dana gives for his *P. carinatus*. Our specimens, on the contrary, agree with the account above quoted from de Man.

Since nothing is said by Fabricius about those particular features in regard to which a distinction has been drawn between his species and those above named by de Haan and Dana, it is certainly a matter of some convenience that all the three supposed species should now be accepted as one and the same.

Along with the female specimen from Zwartskop River already discussed, was obtained a male of just the same size and general appearance ; but in this the teeth on the rostral crest are only seven in number, while on the lower margin there are four, three of them in advance of the foremost upper tooth, and the fourth only slightly behind it.

Kishinouye identifies *P. semisulcatus*, de Haan, with *P. monodon*, Fabricius, and in our specimens the thelycum of the female and the petasma of the male agree very well with the figures of those parts as drawn by Kishinouye for *P. monodon*. On the other hand, Miss Rathbun, in commenting on *P. ashiaka*, Kishinouye, says, "This species is very near *P. semisulcatus*, de Haan (not = *P. monodon* Fabricius, Kishinouye)."

According to Kishinouye, the colour of the Japanese *P. monodon* is dark brown, or rarely blackish.

Locality.—Neighbourhood of Durban and Port Elizabeth.

Penaeus caeruleus, n. sp.

Plates XXI and XXI bis.

The rostrum slightly sinuous, its carina continued backwards almost to the hind margin of the carapace, the dorsal teeth seven, of which the hindmost is less distant from the next preceding than the foremost is from the apex, the ventral teeth three, the middle and hindmost respectively a little in advance of the foremost dorsal tooth and the next behind it; all the teeth are accompanied by a series of setules.

The pleon has the fourth, fifth, and sixth segments carinate, the last the most sharply, this ending in a small tooth. The telson is longer than the sixth segment, but considerably shorter than the uropods. It tapers to a sharp point, and has the sides for at least the distal half fringed with feathered setæ. It is medio-dorsally sulcate except near the base and apex.

The eyes have many plumose setæ on the stems, which are coloured like the rest of the body, but the corneal part is brown.

First antennae. In the first joint the spine of the outer margin is not very elongate, on the other side there is a submarginal ridge; the laminar appendage is nearly as long as the joint, with its apex slightly widened and rounded, the hollowed joint and curving appendage alike thronged with feathered setæ. The second joint is shorter than the first, nearly twice the length of the third, both setiferous. The flagella appear to be sub-equal, about as long as the peduncle, rather broad for some distance from the base, well furnished with setæ on the broad part.

Second antennae. The broad scale reaches a little beyond the peduncle of the first antennae, and nearly to the apex of the rostrum. Its thickened outer margin is smooth and ends in a tooth, from which the apical margin slopes forward, its fringe of setæ curving round in continuity with that of the inner margin. The peduncle is short, the flagellum longer than the animal's body. The mandibles have the cutting-plate and molar in coalescence, the second joint of the palp

very broad, except at the apex. The mouth organs in general are in near agreement with those which Bate has figured in the Challenger Macrura for *P. canaliculatus*, var. *japonicus*, and not essentially different from de Haan's figures of these parts in *P. semisulcatus*, except that the endopod of the first maxillae is much more elongate than de Haan represents it. The biramous epipod is similar in structure on the second and third maxillipeds and the first three peraeopods. In all it is furnished with numerous setæ of varying lengths, which have a formation worthy of notice. The distal part is biserrate, and just in front of the acute apex is thickened by a comb or brush of little close-set spinules on either side. Of the two widely divergent rami or processes one is much longer than the other. The basal joint to which the broad lamina is attached is itself narrow and curved. The exopods of the second and third maxillipeds are long and many-jointed, fringed on either side with long plumose setæ. Those on the first four peraeopods are small, narrow, unjointed, and carry a few setæ similar to those on the epipods. On the fifth peraeopods, which have a pleuro-branchia, I have not found any exopod. These peraeopods are decidedly longer than the fourth pair, but both are much shorter than the third, in which as usual the wrist or fifth joint is conspicuous by its length. The first peraeopods are relatively stouter than the third, but much shorter; the second pair having an intermediate length. The finger in the third pair is shorter than the palm, sub-equal to it in the second, and longer than it in the first pair. In the first pair near the apex of the wrist on the lower side there is a small group of setules, while there is a group on the proximal end of the hand, suggesting a tentative effort at the quasi-prehensible arrangement more effectively carried out in the genus *Sergestes*. The second and third joints in the first peraeopods have each a sub-apical tooth. The second joint only in the second peraeopods is so armed. On the first pleopods of the male the petasma is small and not very complicated in structure, not differing very strikingly from the forms figured by Kishinouye for *P. monodon* and *P. ashiaka*. The thelycum between the fourth and fifth peraeopods of the female, in a specimen intermediate in size between the two males from which the other figures are drawn, shows two longitudinal plates pointing forwards to meet a transverse trilobed plate, with its middle lobe smaller and less advanced than the other two. In two other considerably larger female specimens in the collection the longitudinal plates are in close juxtaposition, concealing all but the middle lobe of the transverse plate.

The inner branch of the uropods reaches considerably beyond the telson, and is fringed with plumose setæ. The considerably longer outer ramus is similarly fringed on the inner margin and round the apex as far as the tooth which occurs low down on the outer margin.

The integument of this species is not strongly calcified, but it has the property of retaining for years in preservative media (spirit and formalin) the fascinating blue colour to which the specific name refers. This attains especial intensity on the eye-stalks, on the scales of the second antennae and on the uropods. The latter, when expanded with all their feathered setæ on either side of the telson, may bear comparison with a beautiful butterfly. On the first, third and sixth segments of the pleon there are transverse bands of deep blue, these being distal in the first and third segments, median in the sixth. There is also often a deepening of the colour along the mediodorsal line of all the segments, producing an illusory appearance of a continuous carina.

The specimen figured at full length measured 95 mm. On dissection the tips of the rostrum and telson proved to be broken, so that when perfect the specimen was probably 100 mm. long. The specimen from which the enlarged separate carapace was drawn, measured 75 mm. The largest specimen received was over five inches in length, with a carapace of over two inches.

Locality.—From Nahoon River (tidal for several miles inland) on E. coast near East London.

This lovely species appears to be very nearly related to *P. monodon*, but separated by smaller size and feebler calcification, the constancy of the rostral dentation, the absence of an exopod from the fifth pair of legs, and the unique colouring. In regard to the latter character it is proper to notice that there is a certain amount of variability, so that Dr. Gilchrist wrote of some of the specimens as being almost white. But even in these extremely pale examples the points of blue are very numerous. Mr. John Wood, of East London, when obligingly sending a second supply of specimens to Dr. Gilchrist, wrote in reply to an enquiry on the subject, "As regards the blue colour, this may have become more pronounced since these prawns first left my hands, but I remember noticing it distinctly at the time they were taken out of the Nahoon River. I may mention these prawns I am sending you are believed to be absent from our rivers during the winter months."

Fam. **Sergestidae.**

1852. *Sergestidae.* Dana, U.S. Expl. Exp., Vol. XIII., p. 601.
1876. *Sergestiden.* Claus, Untersuch. Crustaceen-Systems, p. 35.
1881. *Sergestidae.* Bate, Ann. Nat. Hist., Ser. 5, Vol. VIII., pp. 171, 193.
1882. *Sergestidae.* S. I. Smith, Bull. Mus. Comp. Zoöl. Harvard, Vol. X., p. 96.
1888. *Sergestidae.* Bate, Challenger Macrura, Reports, Vol. XXIV., p. 345.
1889. *Sergestidae,* Chun, Sitzungsber. K. Preuss. Akad. Wiss., p. 347 (537).
1891. *Sergestidae.* Wood-Mason and Alcock, Ann. Nat. Hist., Ser. 6., Vol. VII., p. 190, and Vol. VIII., p. 353.
1893. *Sergestidae.* Stebbing, History of Crustacea, p. 221.
1893. *Sergestidae,* Ortmann, Decap. und Schizop. Plankton—Exp., p. 29.
1895. *Sergestidae.* Faxon, Mem. Mus. Comp. Zoöl. Harvard, Vol. XVIII., p. 208.
1896. *Sergestidae.* H. J. Hansen, Proc. Zool. Soc. London, p. 936.
1898. *Sergestidae.* Ortmann, in Bronn's Thierreich, Vol. V., Lieferung 50, p. 1121.
1901. *Sergestidae.* Alcock, Indian Macrura and Anomala of the Investigator, p. 47.
1903. *Sergestidae.* Hansen, Proc. Zool. Soc. London, p. 52.

For a clear understanding of the present state of science in regard to this family, Hansen's two papers above cited are of primary importance. Ortmann, defining it in 1898, rightly speaks of the chelate structure as more or less reduced, but gives rather a wrong impression, when he goes on to say that it is "almost entirely suppressed on the first and second pairs of peraeopods," and that "on the third pair the chela is minute or there also entirely wanting." But in the dominant genus *Sergestes* the first peraeopods have no chela, while the second and third pairs are on a level, both possessing chelae, though minute ones.

Gen. **Sergestes,** Milne-Edwards.

1830. *Sergestes,* Milne-Edwards, Ann. Sci., Nat., Vol. XIX., p. 348 (in French, Sergeste, p. 346).
1831. *Sergestes.* Latreille, Cours d'Entomologie, p. 384.

1837. *Sergestes*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 427.
1849. *Sergestes*, de Haan, Crust. Japonica, decas sexta, p. 189.
1850. *Sergestes*, de Natale, Descrizione zool. di alcuni Crostacei di Messina, p. 19.
1855. *Sergestes*, Kröyer, Overs. K. Danske Vid. Selsk. Forhandl., p. 22.
1855. *Sergestes*, Kröyer, Monogr. Sergestes, K.D. Vid. Selsk. Skriften, Ser. 5, Vol. IV., p. 219.
1860. *Sergestes*, Stimpson, Proc. Acad. Philad., p. 44 (114).
1880. *Sergestes*, Boas, Vid. Selsk. Skr., Ser. 6, Afd. 1, p. 13 (35).
1894. *Sergestes*, Alcock and Anderson, Journ. Asiat. Soc. Bengal, Vol. LXIII., Pt. 2, No. 3, p. 8.

Other references have been already supplied under the heading of the family. The tabular view given by Ortmann in 1893, of all the species then known, will still be found useful, although, as Hansen has since pointed out, many of the distinctions employed are only signs of immaturity. In the definition of the genus which Ortmann gives in 1898, he agrees with Milne-Edwards and Spence Bate in speaking of the fourth and fifth peraeopods as short and feeble. But the epithet "short" is not particularly applicable to the fourth pair in various species, as for example *S. bisulcatus*, of which Dr. Ortmann reproduces Faxon's figure. Whether the fourth and fifth peraeopods are really weak is questionable, considering the fringes of very long plumose setæ which their joints carry. Ortmann indeed at the earlier date accepted Stimpson's genus *Sergia* for species in which the fourth and fifth peraeopods were little shortened, and had laminar terminal joints, but later on, while accepting from Hansen the reunion of *Sergia* with *Sergestes*, he has omitted the corresponding modification which the generic definition then required.

Sergestes arcticus, Kröyer.

1855. *Sergestes arcticus*, Kröyer, Overs. K.D. Vid. Selsk. Forhandl., No. 1, p. 27.
1859. *Sergestes arcticus*, Kröyer, K.D. Vid. Selsk. Skr., Ser. 5, Afd. 4, p. 240, Pl. 3, fig. 7 a-g, Pl. 5, fig. 16.
1875. *Sergestes Meyeri*, Metzger, Nordseefahrt der Pommerania, pp. 289, 302, Pl. 6, fig. 7.
1882. *Sergestes arcticus*, S. I. Smith, Bull. Mus. Comp. Zoöl., Vol. X., p. 96, Pl. 16, fig. 4.

1884. *Sergestes arcticus*, Smith, Rep. U.S. Fisheries for 1882, p. 415 (71), Pl. 8, fig. 2.
1886. *Sergestes arcticus*, Smith, Rep. U.S. Fisheries for 1885, p. 92, Pl. 20, figs. 1, 2.
1888. *Sergestes atlanticus* (part) Bate, Challenger Macrura, Reports, Vol. XXIV., pp. 389, 394, 436.
1888. *Sergestes magnificus*, Chun. Bibliotheca Zoologica, Vol. I., p. 33, Pl. 4, figs. 4, 5.
1893. *Sergestes arcticus*, Ortmann. Decap. und Schizop. Plankton—Exp., pp. 30, 33.
1896. *Sergia meyeri*, Ortmann, Grundzüge der marinen Tiergeographie, p. 76 (footnote).
1896. *Sergestes arcticus*, Hansen, Proc. Zool. Soc. London, pp. 949, 954.
1901. *Sergia magnifica*, Lo Bianco, Mittheil. Stat. Neapel, Vol. XV, pp. 413, 434.
1903. *Sergestes arcticus*, Hansen, Proc. Zool. Soc. London, pp. 59, 60, Pl. 12, fig. 1 a-c.

In regard to this species a large amount of information has been from time to time made available, but it is somewhat scattered. Some details are here repeated to make it clear that the specimens dealt with really belong to the species in question.

The very short, almost horizontal rostrum, with a vertically truncate portion of the frontal margin on either side, agrees with Metzger's fig. 7b and Hansen's figs. 1a, 1b. The latter author uses this feature in distinguishing Kröyer's species from his own *S. similis*, in which the rostrum is longer, more upturned, and flanked by convex pieces of margin. The supra-ocular and hepatic spines are well developed, and the gastro-hepatic groove distinct. The telson, which is fringed for a considerable distance with long plumose hairs, ends in a sharp apical point, but in the specimen dissected has not the lateral points strongly produced as represented by Metzger. The eyes are about two-thirds as long as the first joint of the first antennae, a character used by Ortmann to distinguish this species from *S. kröyeri*, Bate, in which they are about half as long as that joint.

In the first antennae the broad first joint, measured from its base to the rounded apex, is almost as long as the narrow second and third combined, measured along their inner margin, the propertion being as 38 to 39. The tooth on the outer margin of the first joint is, as shown by Kröyer, not very prominent nor deeply cut. The third joint is barely or not quite as long as the second measured on the inner margin, though somewhat longer on the outer margin.

The mandibles, one with a bidentate, the other with a unidentate apex, have the trunk about as long as the elongate first joint of the palp, which is more than twice as long as the still slenderer second joint. Kröyer says that the molar part is strikingly distinguished from that of *S. Frisii* (*S. atlanticus*, M.-Edw.) in not having a purple colour but a brown horn-colour. The South African specimen, however, is in this part conspicuously purple.

In the second maxilla, Kröyer distinguishes this species from *S. Frisii* by the form of the exopod "which is much more elongate and narrow, especially forwards," and by the axe-like form and much stronger prominence of the first joint. As to the latter character, the lobe of the first joint in our specimen is not axe-like and it is contiguous to the divided lobe of the second joint, not separated as in Kröyer's figure. The first maxillipeds agree with Kröyer's figure except that the epipod is not twisted; both its ends are rounded, the upper much narrower than the lower. The other maxillipeds and the peraeopods appear to me to agree with the descriptions by Smith, Hansen and others. But as to the first peraeopods there is some difficulty, for Smith speaks of them as "sub-chelate." In contrast with the definitely though minutely chelate endings of the second and third pairs, one would expect the term "sub-chelate" to apply to some arrangement of the finger in application to the apex of the preceding joint. But the first peraeopods in this species have a termination which is quite straight, the sixth joint being sub-divided into fifteen articulations, followed by a minute joint, which may be taken to represent the finger. In this respect, therefore, the limb would be called "simple," but where the fifth and sixth joints meet there is a noteworthy arrangement of serrate spines giving a subapical fringe to the former; while from the emarginate base of the sixth joint shorter spines curve backwards to meet the longer spines of the fringe. It looks like an elaborate clasping arrangement. Being at the hinge of these elongate joints, instead of at their apices, its grasping power must be very limited, and in this respect corresponds with that of the true chela in the two following pairs of limbs. Possibly the long delicate second antennae are passed between these sets of pectinate spines for cleaning. The same arrangement is found in *S. prehensilis*, Bate, and is evidently alluded to in its specific name. Smith describes it in his *S. robustus*, and Faxon in *S. bisulcatus*, Wood-Mason. It also occurs in the species next described.

In the uropods the outer ramus is five times as long as its greatest breadth, with the outer margin smooth as far back

as the tooth, the remainder of the margin, which is less than a third of the total, as 22:72, is closely fringed with setæ. The narrower inner ramus reaches as far back as the tooth on the outer margin of the other. Wood-Mason and Alcock in Ann. Nat. Hist., Ser. 6, Vol. VII., p. 190, 1891, record a species as "*Sergestes? arcticus*, Kröyer," of which they say, "Our only specimen wants the spine on the outer margin of the exopodite of the caudal swimmeret, said to be present in *S. arcticus*. Colour in the fresh state deep crimson lake." In the same year, op. cit. Vol. VIII., p. 354, they describe and figure this form as *Sergestes rubroguttatus*, n. sp. Hansen in 1896 suggests that it may be synonymous with *S. Kröyeri*, Bate, but does not repeat this suggestion in 1903. One of the South African specimens, apparently preserved in glycerine, shows numerous small red dots. In the rest preserved in formalin the colour has faded.

The largest specimen, which, like the one above described, is a female, measured 49 mm.; 25·5 from apex of rostrum to end of third pleon segment, thence to end of sixth segment 17·75, and telson 5·75 mm.

Locality.—The specimens were taken 40 miles off Table Mountain, E. by S., probably at a depth of 300 fathoms.

Lo Bianco (loc. cit.), speaking of "*Sergia magnifica* Chun," says that 47 specimens varying in length from 20 to 36 mm. were taken at great depths in the Mediterranean, and infers that it lives at not less than 1,000 metres below the surface. He also states that *Sergia Clausii*, König (Denkschr. Akad. Wien, Vol. LXII., Pt. 1, 1895), from the Eastern Mediterranean, is certainly the same species.

Sergestes gloriosus, n. sp.

Plates XXII., XXIII.

This species belongs to Hansen's first group, and must be placed in that division of it to which he originally assigned *S. robustus*, Smith, *S. japonicus*, Bate (including *S. mollis*, Smith) *S. bisulcatus*, Wood-Mason (including *S. phorcus*, Faxon), and to which he subsequently added *S. prehensilis*, Bate, *S. profundus*, Bate, and *S. challengeri*, Hansen. The last of these received its specific name as being "one of the most interesting species of Crustacea secured by the [Challenger] expedition." Dr. Hansen laments the mutilated condition of the single specimen on which it was founded, but remarks that "it is sharply distingui-hed from all other species hitherto

known by possessing an enormous number of luminous organs" in the regular arrangement which he describes. In the new and much larger species from South African waters there is an apparatus so closely answering in its distribution to the luminous organs of *S. challengeri* that its function must almost certainly be the same. That the formation of the organs is the same in both species is probable, though I cannot pretend to have made out the series of lenses and layers which Hansen figures for the intimate structure. He mentions a chitinous, large, and very thick biconvex lens, the inner side of which is covered by a somewhat thinner concavo-convex lens. Behind this is found a thick layer of glandular cells, light greyish, very large, and most of them elongate, radiating towards the centre of the outer lens. "The diameter of this layer," he adds, "is somewhat larger than that of the inner lens, and when the luminous organs are examined in their natural position with a strong pocket-lens, this layer can often be seen through the skin as a whitish ring around the lens." In the South African species the large and more or less elongate radiating cells are not greyish but red in the specimens figured, though other specimens show that this tint is at length evanescent like the rest of the animal's colouring (in formalin). The whitish ring is conspicuous against an opaque background, but not visible by transmitted light. The organs are here found in all the positions enumerated by Hansen, but there are many in addition, not only on parts which were missing from the mutilated "Challenger" specimen, but more particularly elsewhere. Thus on the carapace, besides the row of four which is here increased to seven on the upper border of the branchial cavity, near the lower border there is a row of eighteen, there are two in an advanced position, and a large single one adjoining the little blunt keel which represents the hepatic spine. The sixth segment of the pleon has a lateral row of seven, the front one much the largest. There is one on the under side of the eye, in the concavity of the corneal margin. In addition to the one on the under side of the third joint, the first antennae have four on the first joint. The scale of the second antennae exhibits eleven instead of four. There do not appear to be any on the first maxillae, as is also the case in the other species, but on the second maxillae there are at least two on the vibratory lamina. The outer ramus of the uropod has a longitudinal interrupted row of nine, while the other species has only two in this position.

The carinate rostrum is very like that described by Hansen for *S. prehensilis*, but it is horizontal. At the base of the spiniform apex the place for a dorsal denticle is barely indicated.

There are short setæ on the convex lower margin. The front of the carapace is closely beset with plumose setæ, and such are found on the rounded postero-inferior margins of the first five pleon segments. The long sixth segment is strongly compressed, with setæ about the minutely produced dorsal apex. The narrow, dorsally flattened, laterally sulcate telson is closely fringed with plumose setæ from the customary lateral bulge to the acute apex. The length equals that of the unarmoured margin of the outer ramus of the uropods.

The eyes are rather over half as long as the first joint of the upper antennae, the corneal part wider than half the length, dorsally longer but ventrally shorter than its own width.

The upper antennae have the second and third joints stout, the third three-fifths of length of second, which is shorter than the first. The characters of the male flagella, as shown in the figure, are not exceptional in this species. The peduncle measured 10 mm., the long flagellum 54.5 mm.

The scale of the lower antennae reaches the middle of the third joint of the upper. The outer spine projects a little beyond the rounded apex, where the scale is less than a third as broad as it is near its base. The delicate flagellum attains a length of 163 mm., a large part of it carrying a pair of finely plumose setæ at apex of each little squarish joint and a shorter seta a little higher up. This graceful apparatus is described by Chun in respect of his *S. magnificus*.

The mouth-organs agree in general with those which Hansen has figured for *S. challengeri*. The mandibles are strong, with the palp large and coarsely armoured. In the broad second maxillipeds the penultimate joint is here decidedly longer than the antepenultimate, which in Hansen's species it equals in length.

The third maxillipeds and the peraeopods are in near agreement with those of *S. robustus* as described by Professor S. I. Smith, except in respect to his statement that the fourth peraeopods are very much stouter than the third. Here they are not so stout, though their breadth may be a little greater, but they are laminar like the fifth pair, and like that pair are adorned with very long plumose setæ. Here, as in *S. robustus*, the upper margin of the fifth and sixth joints is setose as well as the lower in the fifth pair, but not in the fourth. The luminous organs are considerably more numerous in the third pair than in the other peraeopods.

The petasma on the first pleopods of the male has a general resemblance to that of *S. robustus*, but a comparison of the figures shows differences in detail. It is a paired organ, with

the two members closely fastened together at the centre, but the folds of the central portion allow the two limbs to be upon occasion drawn widely apart. Professor Smith has minutely described this apparatus.

The retinaculum of the second pleopods has its apex surrounded by about 17 spinules of various sizes, and along the side lie three large spines.

The inner ramus of the uropods is sub-equal in length to the telson, has its sides for the most part fringed with long plumose setæ, and reaches beyond the apex of the telson, nearly to the spine on the outer margin of the other ramus. Beyond this tooth the outer ramus is produced for about two-sevenths of its total length, the fringing beginning at this point and continuing round the not-very-broad apex far up the inner side.

The red colour of this species fades away gradually in formalin, lasting longest on the setose or spinose armature of the mouth-organs.

The specimen described measured 50 mm. from apex of rostrum to apex of telson, the carapace being 15 mm. in length.

Locality.—The specimens were taken at a depth of 800 fathoms, off Sandy Point.

The specific name alludes to the vast number of luminous organs by which this species is in a manner glorified.

Sergestes bisulcatus, Wood-Mason.

Plate XXIVa.

1891. *Sergestes bisulcatus*, Wood-Mason, Ann. Nat. Hist., Ser. 6, Vol. VII., p. 190 ; Vol. VIII., p. 353.
1893. *Sergestes phorcus*, Faxon, Bull. Mus. Comp. Zoöl., Vol. XXIV., p. 217.
1893. *Sergia* (*?*) *bisulcata*, Ortmann, Decap. und Schizop. Plankton-Exp., p. 37.
1895. *Sergestes bisulcatus*, Faxon, Mem. Mus. Comp. Zoöl., Vol. XVIII., p. 210, Pl. 52.
1896. *Sergestes bisulcatus*, Hansen, Proc. Zool. Soc., London, p. 949.
1898. *Sergestes bisulcatus*, Ortmann, in Bronn's Thierreich, Vol. V., Pl. 114, fig. 2.

Faxon says, " I assign this species to *S. bisulcatus*, Wood-Mason, with some doubt, as the description of the latter species

is not detailed enough to make its identity sure." The same remark will apply to the present specimens. With Faxon's description they agree so closely, that it would be rash to base a specific separation on the one or two minute differences which have to be noticed.

Faxon very carefully describes the carapace, including "rostrum cristiform, short, laterally compressed, directed obliquely upward, subquadrate in outline, the anterior margin produced to form a short point near the middle." Neither in text nor figure does he indicate the slight distal excavation of the upper margin, terminated by a small tooth, found in both the female specimens with which we are here concerned. He says that "the second, third, and more especially the fourth abdominal somites are lightly sulcate in the median dorsal line," which is true of our specimens, but they have the sulcation in a slight degree also on the first segment. In his figure of the uropods Faxon leaves the whole outer margin devoid of setæ, whereas in our specimens this margin, as in the nearest allied species, is bare above the lateral tooth but densely setose below it. The omission of these setæ from the figure is not noticed in the text, and may be due to an accidental oversight. In all other respects the carapace and pleon, the sub-spherical eyes, the maxillipeds and limbs in their details and relative lengths accurately agree with Faxon's account.

A small specimen taken by the Challenger Expedition between Valparaiso and Juan Fernandez, from a depth of 200 fathoms, was named *S. nasidentatus* by Spence Bate, evidently from the peculiarity that it had the "rostrum produced to a sharp point, and armed on the upper surface with a distinct tooth, a little anterior to the frontal margin." Hansen determines this to be a *Mastigopus*, belonging to the same group as *Sergestus arcticus*, Kröyer. It is not impossible that this may be the *Mastigopus* form of *S. bisulcatus*.

Colour, according to Wood-Mason, "in the fresh state deep crimson lake." South African specimens red, fading to orange.

Wood-Mason gives the "length of male from tip of rostrum to apex of telson 60 mm., of female 63 mm." Faxon says. "Length 65 mm., carapace 21 mm." The female specimen here figured measured from tip to apex 76 mm., the carapace in the medio-dorsal line being 24 mm.

Locality.—Cape Point, E. by N., 29 miles; depth, 250 to 300 fathoms; bottom, green sand and mud.

Fam. **Processidae.**

1896. *Processidae*, Ortmann, Zool, Jahrb., Vol. IX., p. 424.
1898. *Processidae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1124.
1901. *Lysmatidae*, M. J. Rathbun, Bull. U.S. Fish. Comm. for 1900, Vol. II., p. 104.
1904. *Lysmatidae*, M. J. Rathbun, Decap. Crust. N.W. Coast N. America, p. 110.
1904. *Processidae*, Nobili, Bull. Mus. d'Hist. Nat., No. 5, p. 234.

Ortmann includes in the family the two genera *Processa* and *Glyphocrangon*, transferring *Lysmata* to his family Latreutidae. For *Glyphocrangon*, A. Milne-Edwards, Alcock adopts a separate family Glyphocrangonidae, not accepting Ortmann's sub-family Glyphocrangoninae. The name Lysmatidae is adapted by Rathbun from the sub-family Lysmatinae, Kingsley, 1878, and implies the inclusion of Risso's *Lysmata* in combination with *Processa*. Miss Rathbun defines the family as having " Rostrum horizontal with the dorsal surface of the carapace ; mandible without a cutting edge and without palp ; first pair of trunk legs more or less chelate, and stronger than the second, but not so long ; second minutely chelate, with carpus sub-divided." *Lysmata* is sharply distinguished from *Processa* by having three flagella instead of two on the first antenna, and the first four pair of trunk legs furnished with epipods, of which they are devoid in *Processa*.

Gen. **Processa,** Leach.

1815. *Processa*, Leach, Malac. Podophth. Brit., text to Pl. 41, published July 1, 1815.
1816. *Nika*, Risso, Hist. Nat. Crust. de Nice, p. 84.
1825. *Nika*, Desmarest, Consid. gén. Crust., p. 229.
1829. *Processa*, Latreille, Règne Animal, Vol. IV., p. 95.
1837. *Nika*, Milne-Edwards, Hist. Nat. Crust., Vol. II., p. 363.
1849. *Nika*, de Haan, Crust. Japonica, decas sexta, pp. 181, 182, 184.
1852. *Nika*, Dana, U.S. Expl. Exp., Vol. XIII., pp. 533, 538.
1853. *Nika*, Bell. Brit. Stalk-eyed Crust., p. 273.
1860. *Nica*, Stimpson, Prodromus, in Proc. Acad. Philad., p. 25 (94).
1863. *Nika*, Heller, Crust. des südlichen Europa, p. 231.

1888. *Nika*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 525.
1890. *Nika*, Ortmann, Zool. Jahrb., Vol. V., pp. 461, 528.
1893. *Nika*, Stebbing, History of Crustacea, p. 229.
1893. *Processa*, Sharp, Proc. Acad. Philad., p. 124.
1896. *Processa*, Ortmann, Zool. Jahrb., Vol. IX., p. 424.
1901. *Processa*, M. J. Rathbun, Bull. U.S. Fish. Comm. for 1900, Vol. II., p. 104.
1904. *Processa*, M. J. Rathbun, Decap. Crust N.W. Coast N. Amer., p. 110.

Desmarest claimed priority for Risso's name, on the feeble ground that Risso had formed the genus under the name of Nika in 1813, though he did not publish it until 1816. Bell says that Risso "had, a short time before Leach's publication, given to the genus the name of *Nika*, of which Leach was not aware at the time. Risso's name must, therefore, be re ained, on the ground of priority of publication." But that is precisely the ground which it has now been proved not to occupy.

The genus is at present fairly well distinguished by the short rostrum, the mandibles without cutting-edge or palp, the unsymmetrical first peraeopods, one member being chelate, the other simple, and the unequal second peraeopods, of which one is much longer than the other, though both alike are chelate, with multiannulate fifth joint.

Miss Rathbun has, however, discovered that among specimens from the same locality some are occasionally to be found which have both members of the first pair of legs chelate, though not otherwise appreciably different from those in which these limbs are unsymmetrical. In other respects also she finds the species most variable, as in length of rostrum, size and shape of the eyes, length of second joint in the first antennae compared with that of the third joint, and length of the antennal scale compared with that of the trunk of the carapace. Under these circumstances the discrimination of species must be subject to much uncertainty. Risso's *Nika variegata* and *N. sinuolata* have apparently not been rediscovered. De Haan distinguishes *N. edulis* from his *N. japonica*, on the ground that the former has the body less elongate, the rostrum carinate, longer than the eyes, and the last two joints of the third maxillipeds together equal to the antepenultimate. In *Processa canaliculata* (*N. edulis*), however, the rostrum is probably seldom longer than the eye. Miss Rathbun says, "The rostrum may be half as long or nearly as long as the eye." The third maxillipeds of an English specimen have the last two joints together, as compared with the preceding joint,

in the proportion of 22 to 26. In Bate's Challenger Macrura the figure, also from an English specimen, gives the proportion of 23 to 33. Bell gives the length of the English species as reaching two inches to two inches and a half; while de Haan for his species gives "Long. corp. 1½ inches."

Of the breathing organs Bate says (*loc. cit.*), "There are five pleurobranchiae, which are suspended near the upper extremity of the chamber, but no other plume or mastigobranchial plates." Nevertheless he rightly figures an epipod (in his terminology, mastigobranchial plate) on the second maxilliped.

Processa canaliculata, Leach.

1815. *Processa canaliculata*, Leach, Malac. Podophth. Brit., text to Pl. 41.
1816. *Nika edulis*, Risso, Crustacés de Nice, p. 85, Pl. 3, fig. 3.
1825. *Nika canaliculata*, Desmarest, Consid. gén. Crust., p. 231, Pl. 39, fig. 4, 4a–g.
1853. *Nika edulis*, Bell, Brit. Stalk-eyed Crust., p. 275, fig. in text.
1888. *Nika edulis*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 527, Pl. 95 (details).
1893. *Nika edulis*, Stebbing, History of Crustacea, p. 229.
1901. *Processa canaliculata*, M. J. Rathbun, Bull. U.S. Fish. Comm. for 1890, p. 104.
1904. *Processa canaliculata*, M. J. Rathbun, Decap. Crust. N.W. Coast N. Amer., p. 110.

The synonymy might easily be lengthened out. There is little doubt that it should include *Nika couchii*, Bell, and Miss Rathbun adds *N. bermudensis*, Rankin. Bate supplements the figure of his own *N. processa* with details from *N. edulis*, and remarks, after mentioning de Haan's *N. japonica*, Dana's *N. hawaiensis*, and Stimpson's *N. macrognatha*, that "the resemblance of the species to each other appears to be great; the only appreciable distinction in the several descriptions, as given by their authors, exists in the variation of length and form of the rostrum."

According to Miss Rathbun, American specimens have the legs more slender than those of European specimens that had come under her observation, thus approaching Bell's var. *N. couchii*. It may be said of the South African specimens that they seem rather more delicate in structure than those

taken in Torbay. Between the rostrum and the spine on the front at the other side of the eyes they have the margin less boldly sinuous, and in the second trunk legs the widening of the third joint is less developed. The apex of the telson is in specimens from both localities furnished with six spines, the intermediate pair the longest and strongest, the central pair slender, much longer than the outermost. Of four dorsal pairs two are tolerably conspicuous, whereas de Haan says that in his *N. japonica* there are no dorsal spines on the telson.

Length, 35 mm.

Locality.—Off Cape St. Blaize. Depth, 40 fathoms. A small specimen about 16 mm. long, with less inflated eyes, was taken between Bird Island and the mainland in 10 to 16 fathoms. It is probably not full grown. A specimen, an inch long, was taken in 30 to 32 fathoms, Knysna Heads, N.E. by N. $\frac{1}{2}$ N., 2 miles.

Fam. **Crangonidae.**

1898. *Crangonidae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1133.
1900. *Crangonidae*. Stebbing, South African Crustacea, Pt. 1, p. 46.
1901. *Crangonidae*, Alcock, Catal. Indian Macrura, p. 114.
1902. *Crangonidae*, M. J. Rathbun, Proc. U.S. Mus., Vol. XXIV., p. 888.
1904. *Crangonidae*, M. J. Rathbun, Decap. Crust. N.W. Coast, N. Amer., p. 111.
1904. *Crangonidae*, Nobili, Bull. Mus. d'Hist. Nat., No. 5, p. 234.

In the first part of the "South African Crustacea" numerous references for this family prior to 1898 have been already supplied, with a discussion of its character and constituents. To the latter should be added the genus *Prionocrangon*, Wood-Mason, 1891, distinguished from the rest by the absence of eyes, agreeing with *Sabinea* and with Nobili's new genus *Coralliocrangon*, in having the second pair of trunk-legs simple, and with *Philocheras* in having only five pairs of branchiae. In referring *Crangon nanus*, Kröyer, to the new generic name *Philocheras*, I overlooked the circumstance that Kröyer's species had been identified with *Crangon bispinosus*, Westwood (see Norman, Ann. Nat. Hist., Ser. 6, Vol. VII., p. 269, 1894). As Westwood's species was instituted in 1835, and Kröyer's not before 1842,

the correct name will be *Philocheras bispinosus* (Westwood). In 1901 Alcock defined *Parapontocaris* as a subgenus of *Aegeon*, from which it is distinguished by having the sterna of the first five pleon segments without instead of with a median spine, and by having the side-plates of the pleon wide and rounded instead of deep and pointed. Lastly, it may be mentioned that *Argis*, Kröyer, 1842, as I have ventured to maintain both in 1893 and 1900, properly takes precedence of the later *Nectocrangon*, Brandt. In this opinion I am now pleased to be confirmed by the high authority of my friends Dr. W. T. Calman, D.Sc., and Mr. C. D. Sherborn, F.Z.S., of the British Museum, who have confirmed my belief that the supposed pre-occupation of *Argis* rested only on the existence of approximately similar names, such as *Argas*, *Arges*, *Argus*. *Arga*, *Argo*, *Argia*, *Argya* and *Argeus* may be added to the cluster, but neither singly or together can they drive Kröyer's *Argis* out of the field.

Gen. **Pontophilus**, Leach.

1817. *Pontophilus*, Leach, Malac. Podophth. Brit., text to Pl. 37A.
1862. *Cheraphilus* (part), Kinahan, Proc. R. Irish Acad., Vol. VIII., Pt. 1, p. 7.
1882. *Pontophilus*, Sars, Vid. Selsk. Forhandl., Christiania, No. 18, pp. 7, 45.
1888. *Pontophilus*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 486.
1890. *Pontophilus*, Ortmann, Zool. Jahrb., Vol. V., pp. 530, 533.
1890. *Pontophilus*, Sars, Arch. Naturv. Christiania, p. 153.
1895. *Pontophilus* (part), Ortmann, P oc. Acad. Philad., p. 175.
1898. *Pontophilus* (part), Ortmann, Bronn's Thierreich, Vol. V., Lieferung 50, p. 1133.
1900. *Pontophilus*, Stebbing, South African Crustacea, Pt. 1, pp. 47, 49.
1901. *Pontophilus*, Alcock, Catal. Indian Macrura, p. 115.
1902. *Pontophilus*, Fulton and Grant, Proc. R.S. Victoria, p. 62.
1903. *Pontophilus*, Gurney, Proc. Zool. Soc. London, Vol. II., Pt. 1, p. 28.

Among the Crangonidae this genus is distinguished by having the second peraeopods much shorter than the rest, but perfectly chelate, the fingers of the fourth and fifth peraeopods not laminar, and the branchiae in seven pairs, with several of their apices turned backward.

Pontophilus gracilis, S. I. Smith.

Plate XXV.

1882. *Pontophilus gracilis*, Smith, Bull. Mus. Comp. Zoöl. Harvard, Vol. X., p. 36, Pl. 7, figs. 2-3a.
1886. *Pontophilus gracilis*, Smith, Rep. U.S. Fish Comm., p. 50, Pl. 11, figs. 1, 1a, 2.
1891. *Pontophilus gracilis*, Wood-Mason and Alcock, Ann. Nat. Hist., Ser. 6, Vol. VIII., p. 361.
1895. *Pontophilus gracilis*, Ortmann, Proc. Acad. Philad., pp. 183, 186.
1901. *Pontophilus gracilis*, Alcock, Catal. Indian Macrura, p. 115.

Various authors have noted that the species which Bate established under the name *P. gracilis* in 1888 as a new species is in fact distinct from the earlier *P. gracilis* of Smith. Nearly at the same time in 1893, Ortmann renamed Bate's species *P. challengeri* and Faxon renamed it *P. batei*.* In comparing the figures and descriptions of the numerous species which have been assigned to the present genus the student will be struck with the perplexing minuteness of the characters by which many of the species have been discriminated. The view which Dr. Doflein has recently propounded† as to the considerable variation which the eyes of deep-sea crustaceans undergo, according to their habitat as well as their age, will make ophthalmic differences less serviceable than hitherto in classification. The value of other distinctive marks will, no doubt, have to be carefully weighed in the future. The specimen here under consideration agrees more closely with Professor Smith's species above named than with any other, although there are some small details to be noticed by which it might claim to be differentiated.

The rostrum is sharp-pointed, not reaching beyond the eyes, with a pair of denticles at about a third of its length from the base. On the under margin near the apex are some setæ not mentioned in the original description. The medio-dorsal carina has two forward-pointing teeth, of which the hinder or cardiac one is fully as large as the front or gastric one, though in Smith's figures it appears to be much smaller. On either side

* Ortmann, Decap. und Schizop der Plankton-Exp., p. 49. Faxon, Mem. Mus. Comp. Zoöl., Harvard, Vol. XVIII., p. 131. Faxon's name, though slightly the earlier, had been anticipated by Kingsley's *Crangon batei*, a synonym of *Pontophilus intermedius* (Bate).

† Biol. Centralblatt, Vol. XXIII., No. 16 and 17, p. 570, 1903.

between these there is a carinate epibranchial tooth, and another (hepatic) more advanced lower down on the side. A tooth bounds the orbit externally, and an antero-lateral tooth is produced about to a level with the rostral apex. Not far behind the antero-lateral there is a little lateral denticle, figured but not mentioned by Smith. For *P. junceus* Bate does not either in figure or description introduce this denticle or the pair on the rostrum.

The first segment of the pleon has a fringe of forward-pointing setules on the front margin of its second division, the third, fourth and fifth segments have similar fringes on the hind margin directed backwards. All the segments have the lower margins setose. The long sixth segment is not clearly sulcate on the back. The long narrow, dorsally-flattened telson has on the lower half two pairs of little spines, of which Smith gives no indication, but which appear in Bate's figure of *P. junceus*. The apex carries two elongate plumose spines, flanked by a pair of strong spines scarcely a third as long, and these by a pair of quite small spines. Smith speaks of " the narrow tip armed with four very slender spines, of which the median are twice as long as the lateral." In Bate's *P. junceus* this armature is left quite indistinct.

The eyes are large, closely contiguous, the cornea extensive, the colour in formalin orange-brown.

The first antennae have the first joint more than twice as long as the second, the point of the lateral process reaching the apex, at some distance behind which the joint has a neat, almost circular orifice, probably auditory. The shorter flagellum is about as long as the peduncle, its companion by about a fourth of its own length longer, this one carrying long setæ except towards the end; both flagella have the first joint elongate, the remaining joints short.

The scale of the second antennae is between three and four times as long as broad, narrowing a little to the rounded apex, which like the lateral margin is fringed with long plumose setæ, the terminal tooth of the unarmed margin not being outstripped by the rounded apex. A rather long and very slender detached flagellum, grasped by the first cheliped, probably belonged to the specimen.

In the third maxilliped the last joint is a little longer than the penultimate, by no means " almost twice the length " as in Leach's original definition of the genus.

The first peraeopods have a distal tooth on the outer margin of the fourth joint, which is fringed with setæ on both margins. The very short fifth joint has a tooth on the inner apex. The sixth joint is widest at the apical tooth of the inner margin,

its palmar margin thin, moderately oblique, and fringed with a few small hairs.

The second peraeopods are very slender and short, the third joint the longest, the fifth a little longer than the trunk of the sixth, the latter being somewhat shorter than thumb or finger, each of which is slender, carrying seven slender spines on the inner margin and two setæ on the outer. They meet only at the tips, each having an unguis, that of the thumb or fixed finger being considerably the larger. Smith gives no details as to this curious chela, and Bate's only intelligible figure of it refers to his *P. profundus*, in which the ungues appear to be almost exactly equal, although the juncture-line between the movable finger and its nail is omitted.

The long slender third peraeopods have the sixth and seventh joints together nearly as long as the fifth joint, in accord with Smith's account. The stiletto-like appearance of the finger is not sustained under high magnification, the apex being pellucid and not acute. The fourth and fifth pairs are comparatively robust, with strong setose fringing, the fourth joint the longest, but not much longer than the sixth (at least in the fourth pair, in the fifth the terminal joints were missing). The finger (in the fourth pair) is quite smooth, narrowly boat-shaped, the true apex being perhaps acute, but both here and in the preceding pair sheltered by a pellucid cap, after a fashion found in some of the Amphipods.

Professor Smith supposed his specimen to be a female, possibly immature, and describes the first pleopod as having its inner ramus about as long as the peduncle, "linear, and the margins not ciliated," the outer ramus "narrow-ovate, considerably longer than the inner, and of the usual structure." The specimen here described agrees fairly with these relative dimensions, but differs in having the inner ramus strongly fringed with plumose setæ on both margins. The second pleopod in the American description has the inner ramus "a little shorter and much narrower than the outer, and has a single stylet two-fifths as long as itself arising from the inner margin near the base." This coupling process or retinaculum is figured by Smith as naked, whereas in the South African specimen it is fringed with plumose setæ. Here too, the inner ramus is not at all shorter than the outer. The apical hooks in two rows, are about a dozen in number, seemingly agreeing closely in shape with those figured by Professor H. Coutière* for *Alpheus strenuus*, Dana.

* Les Alpheidae, p. 303, fig. 373, 1899.

The uropods agree with Professor Smith's description, if allowance be made for the broken tips of the inner ramus.

The colour of the specimen in formalin was pure white, except the eyes. Wood-Mason and Alcock say of their specimens, "Colours in life transparent cloudy purple, corneae milky orange. (In spirit rich orange-coloured and opaque)."

Length, from apex of rostrum to end of telson, 34 mm. Professor Smith's specimen between the same points measured 30 mm. He had an adult male specimen, measuring 28 mm. The female specimen from 250 fathoms between the Philippines and Borneo, which Bate named *P. junceus*, was 38 mm. long. Of the species which Bate named *P. gracilis*, he had several specimens from far distant localities, and various depths. The largest, a female, measured 64 mm., but he also had females (one bearing ova) which were only 35 mm. long.

Habitat.—The specimen figured, a female with a few eggs, was taken with another at a depth of 250 fathoms, 40 miles off Table Mountain. The specimen figured by S. I. Smith was taken at 225 fathoms, N. Lat. 32° 18′ 20″ W. Long. 78° 43′.

The differences from the type which have been pointed out, chiefly concern the armature of the pleopods and telson. Unless supported by some considerable distinction in the second pair of chelipeds, these can scarcely justify any separation of the two forms.

Fam. **Hippolytidae.**

1888. *Hippolytidae*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 576.
1893. *Hippolytidae*, Stebbing, History of Crustacea, p. 233.
1898. *Hippolytidae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, pp. 1124, 1129.
1898. *Hippolytidae*, Borradaile, Proc. Zool. Soc. London, p. 1009.
1900. *Hippolytidae*, Holmes, Occas. Papers California Ac. Sci., No. 7, p. 192.
1904. *Hippolytidae*, M. J. Rathbun, Decap. Crust. N.W. Coast N. Amer., P. 56.

The definition which I gave of this family in 1893 may be here repeated :—"The rostrum is of important size, the eyes are not covered by the carapace ; the mandibles may have a cutting edge and 'palp' or be without one or both. The

first pair of trunk legs have moderate-sized chelae ; the second pair are also chelate, with the wrist or fifth joint sometimes much and sometimes little sub-divided."

The new genus about to be described falls fairly well under this definition, although only one member of the second pair of trunk-legs might be considered chelate in the strict sense of the term, the other abnormally developed member being complexly sub-chelate. Both members have the fifth joint or " wrist " sub-divided into four articulations, by this plurality settling the genus in the legion Polycarpinea. Usually the divisions of the wrist or carpus are either more or fewer than four.

Ortmann has withdrawn some of the genera included by Bate in this family to form a new family *Latreutidae*, in which he includes *Lysmata*, Risso, formerly regarded as a member of the Nikidae. Borradaile (Willey's Zool. Results, Part 4, p. 414, 1899) expresses the opinion that " the difference between the Latreutidae and Hippolytidae will not . . . be ultimately found to be of more than sub-family value." As already noted, Miss Rathbun in 1904 places the genus *Processa*, Leach, in a family Lysmatidae, thus by implication not agreeing with Ortmann's removal of *Lysmata* from the Nikidae. In any case, however, the name of the family should not be either Nikidae or Lysmatidae, but Processidae as given by Ortmann in 1896.

Gen. **Leontocaris,** nov.

First antennae with two flagella subequal in length. Scale of second antennae broad. Mandibles with cutting edge, molar, and small one-jointed palp. First maxillipeds with exopod strongly laminar. Third maxillipeds pediform, bulbous at base, with no distinct exopod. First peraeopods slender, chelate, fifth joint elongate. Second peraeopods unsymmetrical, one slender, normally chelate, the other with sixth joint both long and broad, the finger flat, distally widened and curving over the much shorter thumb. First pleopods of the male with inner ramus short and broad, carrying a partially-separated retinaculum.

The name *Leontocaris* signifies the Lion's Shrimp, the representative species having been obtained by submarine exploration off the Lion's Head.

As Paulson's work on the Crustacea of the Red Sea appears to be rare and when available presents an obstacle to some students by being in the Russian language, I venture to translate his definition of the genus *Anchistioides* :—" Body compressed. Peduncle of upper antennae very short ; outer flagellum very thick, and at middle of its length furcate. Scale of outer antennae wide. Mandibles as in *Anchistia*. Anterior margin of cephalothorax with a single spine. Endognath of second maxillae rudimentary. Exognath of first maxillipeds laminar. Outer maxillipeds slender, without exognath, and the last two joints considerably shorter than the second (antepenultimate). The first two pairs of thoracic legs chelate, the second more strongly than the first. Inner branch of first pleopods in the male short, but sub-divided, the inner division having hooks, met with in Caridea only on appendage of the following pleopods. The second pair as in *Anchistia* and *Palaemon*. Hind margin of telson truncate, not acute."

There are thus some notable agreements in the maxillipeds and pleopods, but the triple flagellum and short peduncle of the first antennae, the palpless mandibles, and the rudimentary endopod of the second maxillae, keep *Anchistioides* very distinct from the present new genus.

Leontocaris paulsoni, n. sp

Plate XXVI.

Rostrum longer than the carapace behind it, reaching beyond the antennal scale, with eight strong teeth on the under margin, the first five closer together and more projecting than the rest ; on the upper margin are two small teeth close behind the acute apex, then at intervals come four conspicuous teeth, one of which is behind the eyes, and to the rear of this the carapace has two teeth in succession near the centre. The external angle of the orbit is acute, and below this a strong submarginal tooth commences a sublateral carina, that becomes feeble to the rear. The fronto-lateral angles are rounded. The partial carina of the third pleon segment is produced over the hind margin into a tooth slightly curved downwards. The rounded postero-lateral lobes of the fifth pleon segment are produced above into a small tooth. The telson is longer than the third pleon segment, narrow, tapering, with seven pairs of lateral

spines at very unequal intervals and an apical pair, from between which a pair of setæ project.

The eyes are cylindrical, with small corneal surfaces which do not, when turned outwards, reach beyond the breadth of the antennal scales, in formalin orange-coloured over dark pigment.

In the first antennae, the peduncle just reaches end of antennal scale, first joint longer than second and third combined, with a broad but acutely ending spine-process little more than half its length. The flagella are longer than the peduncle, the upper outer one thickened and carrying transverse rows of setæ for nearly three-fifths of the length, its much more slender and slightly shorter companion maintaining its thickness for a greater extent, so as subterminally to be the stouter of the two. In one specimen out of five this inner flagellum was much shorter than the other.

The second antennae have the scale thrice as long as broad, the flatly-rounded apical margin not reaching beyond the external tooth, which is the terminal one of nineteen, fringing the outer margin for more than half its length. The flagellum is slender, about 50 mm. long.

The mandibles have a cutting edge of five teeth, three of which are in a cavity between two that are much more prominent. The molar is strong, molar-like in one point of view, in another showing a dense tuft of setules between a strong tooth and a short, six-toothed blade. The slender one-jointed palp carries four setæ.

The first maxillae have the inner plate (lacinia media) fringed with slender spines, the outer plate with similar spines and also two rows of short spine-teeth, five in each row ; the remaining slender process, representing the fourth and fifths joints, carries two spines, of which the apical is the shorter.

The second maxillae have a rounded lobe of the first joint fringed with setæ, the second joint with a divided plate (lacinia media), both parts fringed with various spines, and the exopod very large, rounded at both ends and fringed with plumose setæ, the remainder of the maxilla constituted by a short, narrow piece ending in three setæ.

The first maxillipeds have an epipod narrowing upwards and downwards, shaped like the conventional flying bird in pictures. The exopod is laminar for the most part, much like that of the second maxillae, but with a short terminal lash.

The second maxillipeds have a long, slender exopod terminally sub-divided into short articulations ; the last two joints of the endopod strongly reflexed, the large sixth joint having its

truncate distal margin concurrent with the base of the short, strongly-spined seventh joint.

In the third maxillipeds the second joint is externally coalesced with the following composite joint, both being hairy at the dehiscent inner margins ; beyond the bulbous base of the third joint these organs are very slender, and in one specimen membranaceous, the fifth joint two-thirds the length of the terminal, the latter beset with oblique little rows of setæ, and its apex doubtfully separate as a seventh joint ; the fifth and following joint or joints are together shorter than the composite third and fourth. These and the five following pairs of appendages are supplied with branchiae.

The first peraeopods are slender, the fifth joint longer than the fourth, which in turn is longer than the third, this about equalling in length the chela ; the thumb and finger are much shorter than the palm, and have their tips hidden together in a bush of setæ.

The second peraeopods at full stretch, which in preserved specimens they resist being, are much longer than the first. In one member of the pair, left or right as the case may be, the limb is slender and partly membranaceous from the second joint onwards, the fourth joint long, a little longer than the third, the fifth nearly equal to those two combined, forming four articulations, of which the first is rather more than thrice as long as the rest together, and the fourth is two or three times as long as the two small intermediate ones combined ; the chela is less than half as long as the first of these four, of the same pattern as in the preceding pair, but larger. The other member is extremely different in appearance, although the structure is almost precisely similar to the end of the first articulation of the fifth joint ; this elongate slender piece is accommodated in a slightly hollowed expansion in the distal two-thirds of the great sixth joint, with which it is connected by the three articulations still to be accounted for ; two of them form a sharp bend, and the last a small cup-shaped wrist, enabling the fifth and sixth joints to lie close together almost as if they were one piece. The inter-locking is helped by a sub-distal and two distal teeth on the second, and a distal one on the fourth articulation, not shown in the figure, as they only come into notice when the fifth and sixth joints are drawn asunder. As in the other member of the pair, the fifth joint also here folds closely against the fourth, which is slightly grooved, and has the margin in part feebly tuberculate. The large hand, though of considerable width at the middle, and sometimes much wider than in the specimen figured, is much

longer than wide ; it is produced distally into a short tridentate thumb, between the two inner and less produced teeth of which there fits a tooth on the inner margin of the chopper-shaped movable finger ; this joint has its widened distal end prolonged beyond the thumb, to which it presents a reflexed, more or less acute, apical point.

The third, fourth and fifth peraeopods are alike in structure, and little differing in length, the fourth a little shorter than the third, a little longer than the fifth ; they are all stouter than the first pair and the slender member of the second peraeopods ; the fourth joint is the longest, the sixth slightly curved and a little longer than the fifth : the finger very small, curved, finely setulose.

The first pleopods in the male have the inner ramus a short oval fringed except on part of the inner margin with long setæ, but from the inner margin there is partially separated a retinaculum, beset with little curved spines, and having at its lower end a close group of the usual hooks. The outer ramus is more than twice as long as the inner, lanceolate. In the female both rami are lanceolate, the inner more than half as long as the outer, with the eggs tenaciously adherent. In the second pleopods the male has the retinaculum separated in the usual way, and another appendage of equal length between it and the main ramus, which is normally developed. Both these pairs closely approach the description and figures given by Paulson for the corresponding parts of his *Anchistioides compressus*.

The uropods reach to a very trifling degree beyond the apex of the telson. Both rami are round-ended, the inner the narrower, fringed with plumose setæ on both margins ; the outer ramus is similarly fringed on the inner margin and round its apical division. The upper division from the boundary tooth upwards has a long piece of the outer margin cut into teeth, in striking agreement with the armature of the scale in the lower antennae, here as so often elsewhere the two extremities of the animal showing a correspondence in development.

The length of the male specimen figured was 46 mm., from apex of rostrum to apex of telson.

Habitat.—The place of capture was 25 miles off Lion's Head, N. 67° E.; depth, between 131 and 136 fathoms.

The specific name is given out of respect to the Russian naturalist Paulson, and to call attention to his probably little known genus *Anchistioides*, with which the present shows some rather remarkable points of connection.

Gen. **Merhippolyte,** Bate.

1888. *Merhippolyte*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 618.
1893. *Merhippolyte*, Stebbing, History of Crustacea, pp. 234, 237.
1898. *Merhippolyte*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, Lieferung 50.

This genus appears to be well distinguished from others of the family by the combined characters of the mandibles and second peraeopods. The mandibles have a strong molar, a thin cutting edge, and a three-jointed palp; the fifth joint or wrist in the second peraeopods exhibits numerous subdivisions. Bate's *Chorismus* is said in the generic account to have a two-jointed palp to the mandible, but in the description and figure of the single species assigned to the genus the mandible is furnished with a three-jointed palp. The mandible of *Chorismus*, however, is very different from that of *Merhippolyte*, which has the three joints of the palp sub-equal, and the cutting edge quadridentate, whereas in the other genus the first joint of the palp is much shorter than the second or third, and the cutting edge is degraded to a single point. Moreover, the branchial formulae of the two genera are said to be quite distinct.

Merhippolyte agulhasensis, Bate.

1888. *Merhippolyte agulhasensis*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 619, Pl. 110, fig. 4.

The carapace has five medio-dorsal teeth, of which two are to the rear of the orbits; the teeth on the lower margin of the rostrum in our larger specimen are five in number, but six in the smaller one; in both the tip of the rostrum is bidentate, the lower point being the more advanced. This latter detail is not mentioned by Bate. In the first antennae the long tooth on the outer margin of the first joint has a small tooth at the base of its own outer margin. The broad scale of the second antennae, which has a rounded end projecting very little beyond the strong tooth at the lateral apex, does not in our specimens or even in his own illustration agree with Bate's statement that it "reaches as far as the extremity of the rostrum."

According to Bate, the third maxillipeds have no exopod, but this is a mistake, due probably to the concealment of this narrow and not very elongate appendage behind the long antepenultimate joint of the maxilliped. In the first peraeopods the second and third joints have each an apical tooth. The sixth joint of these chelipeds is a little longer than the fifth. In the next pair the chela is very small, the slender delicate wrist fifteen-jointed. The three following pairs of peraeopods are nearly alike, but the last pair has to itself a graduated row of serrate spines leading to the base of the finger, and the finger's inner margin carries six spines instead of five. In all three pairs the spine adjoining the nail is, except at the tip, much wider than the others. In addition to the three dorso-lateral pairs of spinules, the last of which is sub-apical, the telson has a larger apical pair with two intervening setæ.

Length.—One specimen measured 63 mm. in length; the other, far more slender, was only 40 mm. long.

Locality.—The larger specimen was taken 25 miles off Lion's Head, between 131 and 136 fathoms, the smaller at "Gericke Point N. ¾ E., Knysna Heads E. ¾ N.," in a depth of 116 fathoms, on sand, shells and rock. Bate's specimens were dredged at a depth of 150 fathoms, south of the Cape, and his description in general fully corresponds with the features of the new examples.

Fam. **Miersiidae.**

1878. *Oplophorinae*, Kingsley, Bull. Essex Inst., Vol. X., p. 68.
1882. *Ephyrinae*, S. I. Smith, Bull. Mus. Comp. Zoöl. Harvard, Vol. X., No. 1, p. 66.
1885. *Ephyridae*, Sars, Norske Nordhavs Exp., Crust., Vol. I., p. 35.
1885. *Miersiidae*, S. I. Smith, Rep. U.S. Fish. Comm. Extr., pp. 4, 63 (p. 667).
1888. *Acanthephyridae*, Bate, Challenger Macrura, Reports, Vol. XXIV., pp. 481, 927.
1891. *Miersiidae*, Wood-Mason and Alcock, Ann. Nat. Hist., Ser. 6, Vol. VII., p. 194.
1892. *Acanthephyridae*, Wood-Mason and Alcock, Ann. Nat. Hist., Ser. 6, Vol. IX., p. 360.
1893. *Acanthephyridae*, Stebbing, History of Crustacea, p. 242.
1893. *Acanthephyridae*, Ortmann, Decap. und Schizop. Plankton-Exp., p. 42.

1893. *Miersiidae*, Faxon, Bull. Mus. Comp. Zoöl. Harvard, Vol. XXIV., p. 206.

1895. *Hoplophoridae*, Faxon, Mem. Mus. Comp. Zoöl. Harvard, Vol. XVIII., p. 159.

1898. *Acanthephyridae*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, Lieferung 50, p. 1,123.

1901. *Hoplophoridae*, Alcock, Catal. Indian Macrura, p. 72.

1904. *Oplophoridae*, M. J. Rathbun, Decap. Crust. N.W. Coast, N. Amer., p. 27.

The choice between Miersiidae and Oplophoridae for the name of this family is difficult to make with any feeling of security. Roux in 1831 established the genus *Ephyra*, under a preoccupied name, for which Kingsley in 1879 substituted *Miersia*. In 1849 de Haan (Crustacea Japonica, decas sexta, p. 185) doubtfully accepted *Ephyra*, Roux, for a new species, *E. compressa*. Ortmann in 1894 (Proc. Ac. Philad., p. 400) makes de Haan's *Ephyra*, Kingsley's *Miersia* and the *Paratya* of Miers, all synonyms of *Xiphocaris* von Marten's, 1872, adding a footnote on *Ephyra*, de Haan, "Non *Ephyra* Roux, Memoir. Salicoques, 1831, p. 24, which is identical with *Acanthephyra*, A. Milne-Edwards, and belongs to the Acanthephyridae." But unfortunately Risso's two species for which Roux founded the genus have not been again recognised, and Faxon accordingly proposes to leave the name *Miersia* in abeyance until they are re-discovered. On the other hand, the definition given by Roux rather favours the inclusion of his genus in this family, of which in that case it will be the earliest member. Should its claims be rejected, the next in order is *Oplophorus*, Milne-Edwards, 1837. On what grounds I myself stated in 1893 that Acanthephyrinae antedates Miersiidae I cannot now ascertain. This is of no importance to the present question, for if *Acanthephyra* should prove to be equivalent to Kingsley's *Ephyra*, it would lapse as a synonym of *Miersia* (founded on the same type), and if it be distinct from *Ephyra*, *Oplophorus* will then rank above it as the eponymous genus of the family.

Ortmann in 1898 gives the following characters:—The mandible is only obscurely divided and carries a palp; the inner lobe of the first maxilla is blunt, scarcely curved; the sixth and seventh joints of the second maxillipeds are laterally articulated (attached broadside to broadside instead of end to end); the chelae are normal, the fifth joint (carpus) never excavated; all five pairs of trunk limbs are furnished with exopods.

He sub-divides the family into three subfamilies, Acanthephyrinae, Notostominae (Tropiocaridae, Bate), and Nematocarcininae. Faxon in 1895 retains the family Nematocarcinidae as distinct.

Gen. **Acanthephyra,** A. Milne-Edwards.

1881. *Acanthephyra*, A. Milne-Edwards, Ann. Sci. Nat., Zool., Ser. 6, Vol. XI., Art. 4, p. 12.
1882. *Miersia*, S. I. Smith, Bull. Mus. Comp. Zoöl. Harvard, Vol. X., p. 66.
1884. *Acanthephyra*, S. I. Smith, Rep. U.S. Fish. Comm, p. 372.
1895. *Acanthephyra*, Faxon, Mem. Mus. Comp. Zoöl., Harvard, Vol. XVIII., p. 160.
1901. *Acanthephyra*, Alcock, Catal. Indian Macrura, p. 75.

Other references can be found in Faxon's work or under the citations already given for the family. As already pointed out, Kingsley's *Miersia* is of earlier date than *Acanthephyra*, but there is no certainty that it represents the same genus. In 1816 Risso described a species as *Alpheus pelagicus*, which in 1826 he transferred to *Pandalus*. Of this species he says, at the latter date, " Son corselet est alongé, orné sur les côtés d'une suture courbe, avec quatre aiguillons et un rostre cannelé," etc. His original description ran :—" Son corcelet est alongé, traversé par une suture courbe sur les côtés, et terminé sur le devant par quatre aiguillons, avec un rostre canelé," etc. His later figure shows a longitudinal row of four denticles on the side of the carapace, of which there is no trace in his earlier figure. Also his earlier description seems to imply that it is the front margin of the carapace which carries the teeth. In that case they might be the antennal and branchiostegal teeth which are so placed in *Acanthephyra*.

Milne-Edwards (Hist. Nat. Crust., Vol. II., p. 422, 1837), says :—" M. Roux nous apprend que ses Ephyres ont le corps comprimé latéralement, la carapace lisse, l'abdomen caréné et le rostre denté ; les pates-mâchoires sont tres-alongées et les pates thoraciques portent à leur base un appendice palpiforme, mais ne paraissent pas avoir de point comme dans le genre suivant ; les pates des deux premières paires sont petites, plus courtes que les suivantes, et didactyles ; enfin les carpes sont simples." " The following genus " referred to is Milne-Edwards' own new genus *Oplophorus*, the description of which

does not make clear what he means by saying that the thoracic feet in *Ephyra* appear not to have any point. Apart from this obscurity the definition contains nothing antagonistic to *Acanthephyra*.

It may be worth noting that the reference which Bate gives for *Acanthephyra purpurea*, A. Milne-Edwards, the first recorded abysmal species of the genus, is erroneous. Instead of "Comptes rendus, t.xcii. p. 1396, 1881," the volume should be XCIII., and the page 933.

Acanthephyra batei, n. sp.

Plate XXIVb.

This form must take its place in a group of closely-related species, *A. purpurea*, A. Milne-Edwards, *A. agassizii*, S. I. Smith, *A. sica*, Bate, *A. sanguinea*, Wood-Mason and Alcock, *A. acanthitelsonis*, Bate. According to Alcock *A. agassizii* is a synonym of *A. purpurea*. Distinguishing features for the present species will be noted in the course of description.

The straight, slender rostrum is scarcely as long as the rest of the carapace. It has seven teeth above and four below, all well separated, the hinder ones not approximate as in *A. sanguinea*, which has the rostrum relatively much longer and curved upwards. In the other species mentioned the rostral spines are more numerous. The antennal and branchiostegal spines are distinct, not obscure as in *A. sanguinea*. The low rostral carina ends a little behind the small hindmost tooth, and the carapace is here obtusely channelled on each side of the widened base of the rostrum. The first pleon segment like the bulk of the carapace is devoid of any medio-dorsal carina, but the rest of the pleon as far as the telson is fully carinate, in this respect differing from *A. purpurea*, in which the carina is said to begin at the posterior end of the second segment. There is an apical tooth to the carina on the third to the sixth segments —largest, but not large, on the third ; smallest, but distinct, on the fourth segment. The telson reaches beyond the uropods. It is hollowed beneath, and above carries five dorso-lateral pairs of spines, the first a little above the middle, the last immediately above the apex. They are not quite symmetrically placed in our specimen, and one of the last pair is missing. At the apex are two longer spines, and between these projecting from the ventral surface are a trio of spines, the central one the stoutest and slightly the longest, but all shorter than the two

outer spines, between which above there are two delicate, feathered setæ. In *A. acanthitelsonis* the telson is "armed with about forty strong articulating spines, twenty on each side, and terminating in two smaller ones at the extremity (Challenger Macrura, p. 745).

The eyes are short, tolerably broad. They are not in good condition, but show the peculiar character which Bate figures in *A. angusta* and *A. sica*, and with variations in some other species. Faxon speaks of this as "an oblong black 'ocellus' barely connected with the eye, on the dorsal surface of the ocular peduncle," occurring in some specimens of *A. agassizii* (Mem. Mus. Comp. Zoöl., p. 161, 1895). There is a small blunt projection distally on the inner margin of the peduncle.

The first and second antennae agree with Bate's generic description and with the figures he gives of *A. sica*.

The first maxillipeds also agree with Bate's figure as regards the smooth bifid epipod, the much curved, broad, setose exopod; but the endopod has a setose terminal (fourth) joint, which Bate does not indicate. Concerning the third maxillipeds Bate says, "The coxa supports externally a lunate calcified plate that articulates with a rudimentary mastigobranchia, that is independent of any branchial plume; while next it a plume is attached to the membranous articulation." He figures this appendage for *A. sica*, and in his description says, "The coxa carries a lunate disc-like plate, of which the upper horn is bifid." In our species the little horn is just above the articulation of the epipod instead of at the opposite end of the lunate plate as shown for *A. sica*. It confronts a little raised point.

The first peraeopods are stouter and shorter than the second, and have a close-set comb of short spines on the palm of the hand, and the third and fourth joints furnished with a thick fringe of short feathered setæ at right angles to the margin. The plate that bears the epipod is not lunate and has the accessory horn and confronting point somewhat concealed; at its outer extremity there is a blunt process carrying a bunch of very long flexible and distally biserrate setæ.

The second peraeopods have but few setae on the slender palm, the third and fourth joints armed as in the first pair, and the epipod of similar structure.

The last three peraeopods are supplied on both margins with long feathered setæ; the third and fourth pairs having also strong spines along the third and fourth joints, the fingers straight and thickly set with short spines along both margins. The fifth pair have a comb of short spines along the distal

part of the sixth joint, the finger short, curved, pectinate, almost hidden in a bush of spine-like setæ. They are decidedly shorter than the third and fourth pairs, not as in *A. sanguinea* "very decidedly longer." The epipod on the third pair as in the second. In the fourth pair there is no epipod, but the process with long biserrate setæ is present, and in connexion with it a small plate with small upturned process.

The setæ in many parts show rich orange and red tints. Original colour reported as red.

From the considerable curvature of the specimen the length is not easy to measure exactly. It may be taken as between 80 and 90 mm.

Locality.—Cape Point Lighthouse, S. 83° E., 35½ miles. Depth, 360 fathoms. Bottom, hard ground with black specks.

Gen. **Notostomus**, A. Milne-Edwards.

1881. *Notostomus*, A. Milne-Edwards, Ann. Sci. Nat., Ser. 6, Vol. XI., p. 7.
1884. *Notostomus*, S. I. Smith, Rep. U.S. Fish. Comm. for 1882, p. 377.
1886. *Notostomus*, S. I. Smith, Rep. U.S. Fish. Comm. for 1885, p. 72.
1888. *Notostomus*, Bate, Challenger Macrura, Reports, Vol. XXIV., p. 824.
1893. *Notostomus*, Stebbing, History of Crustacea, p. 246.
1895. *Notostomus*, Faxon, Mem. Mus. Comp. Zoöl. Harvard, Vol. XVIII., p. 170.
1898. *Notostomus*, Ortmann, in Bronn's Thierreich, Vol. V., Pt. 2, p. 1126.

Bate observes that the original account of the genus given by A. Milne-Edwards requires some modification, inasmuch as the brevity of the rostrum does not apply to all species, and the excess of length imputed to the first trunk-legs as compared with the second probably applies to none of them. Ortmann places the genus in his sub-family Notostominae along with *Ephyrina*, Smith, and *Hymenodora*, Sars, distinguishing this sub-family from its two companions, as having the cephalothorax compressed only in the dorsal part, so that a sharp lofty median carina is formed, and as having the trunk-legs not strikingly elongate.

Notostomus westergreni, Faxon.

1893. *Notostomus westergreni*, Faxon, Bull. Mus. Comp. Zoöl. Harvard, Vol. XXIV., p. 208.
1895. *Notostomus westergreni*, Faxon, Mem. Mus. Comp. Zoöl. Harvard, Vol. XVIII., p. 171, Pl. F.

The long, straight, or very slightly sinuous rostrum, measured to the base of the eye, is three-sevenths of the total length of the carapace (rostrum included). Its under margin has fifteen teeth, not evenly spaced, and beginning some little distance in advance of the eyes. On the upper margin, there are twenty-eight teeth, ascending the slope but not fully reaching the level part of the carina, which is finely serrate behind the teeth almost completely up to the hind margin. In Faxon's specimen the rostrum was defective. Apart from this his lucid description of the carapace with its numerous carinae minutely tallies with our specimen, the only difference being that the dorsal median line of the carapace might here be described as rather considerably, instead of "but moderately," elevated above the level of the rostrum.

The antennal scale in our specimen agrees fairly well with that figured on Faxon's plate, but the outer apical tooth is much longer on the left scale than on the right. The flagellum of the second antennae and the upper branch in the first antennae are of great length.

Of the pleon, Faxon says, "All the abdominal segments are carinated in the dorsal median line, and the third, fourth and fifth are armed with a posterior tooth; the first and second segments are notched posteriorly in the dorsal median line. The telson is channeled on the dorsum, and furnished with about four pairs of dorsal, but no marginal spines; its tip is broken off and its armature thus obliterated." The South African specimen has the sixth segment posteriorly toothed just as strongly as the preceding three, and if Faxon's species be without this fourth tooth, some suspicion might be justified in regard to the identity of the two forms. But according to the figure *N. westergreni* has the sixth segment toothed, though less sharply than the companion segments, a circumstance on which little stress can be laid, seeing that both telson and rostrum were damaged, and any outstanding point may easily have been likewise blunted.

The telson is fringed with setæ for the distal two-thirds of its length, carries five pairs of very small dorsal spines external to the bicarinate median channel, and a pair at the very narrow but not sharp-pointed apex. This apex reaches a little beyond

the inner ramus of the right uropod, but falls a little short of that on the left side, this want of symmetry corresponding with that observed in the antennal scales. The outer ramus of the uropods is considerably longer than the inner, and has a well-marked lateral tooth.

The total length may be estimated at 144 mm. if the inflexed part of the pleon were straightened out, the carapace with rostrum measuring 74 mm. in length by 39 mm. in greatest height.

Locality.—Under date August 19th, 1903, Dr. Gilchrist writes concerning this specimen, " A deep sea prawn of a bright red colour. The original colour will probably be retained when you get it, as we have had it for over a fortnight without any change being observed. Procured in a fine tow net attached to beam trawl. Loc. Cape Point, N. 70° E., 40 miles. Depth, about 800 fathoms. Bottom, green mud." After a year the fine red colouring remains, as depicted in Faxon's plate by Westergren.

SCHIZOPODA.

Fam. **Thysanopodidae.**

1852. *Euphausidae*, Dana, U.S. Expl. Exp., Vol. XIII., p. 636.
1863. *Thysanopodea*, Claus, Zeitschr. wiss. Zool., Vol. XIII., Pt. 3, p. 442.
1885. *Euphausiidae*, Sars, Challenger Schizopoda, Reports, Vol. XIII., pp. 10, 62.
1900. *Euphausiidae*, Stebbing, Proc. Zool. Soc. London, p. 537.

Consistency requires that this family should take the name Thysanopodidae from the premier genus *Thysanopoda*, Milne-Edwards, 1830 (Ann. Sci. Nat., Vol. 19).

Gen. **Euphausia,** Dana.

1852. *Euphausia*, Dana, U.S. Expl. Exp., Vol. XIII., p. 637.
1885. *Euphausia*, Sars, Challenger Schizopoda, Reports, Vol. XIII., p. 63.
1900. *Euphausia*, Stebbing, Proc. Zool. Soc. London, p. 538.

Under the last reference a rather full discussion of this genus is given, which need not be here repeated.

Euphausia latifrons, Sars.

1883. *Euphausia latifrons*, Sars, Vid. Selsk. Forhandl. Christiania, No. 7, p. 19.

1885. *Euphausia latifrons*, Sars, Challenger Schizopoda, Reports, Vol. XIII., p. 95, Pl. 16, figs. 17-23.

1900. *Euphausia latifrons*, Stebbing, Proc. Zool. Soc. London, p. 544.

This small and delicate species appears to be well marked by the broad, sub-quadrate, distally-truncate rostrum. The third segment of the pleon is not produced dorsally to a tooth. The sixth segment is longer than the preceding, and forms a very small dentiform projection. The preanal spine is small, simple, unguiform. The first joint of the first antennae carries distally a short membranous lobe and has the outer margin prolonged into a strong tooth. The branchiae are divided into comparatively few lobules.

According to Sars the carapace is without any lateral denticle. Of the South African specimens only one or two could be found answering to this character. The greater number have a well-marked, forward-pointing denticle on each margin, at about three-fourths of its length from the front. As this denticle seems to be strongest in specimens which from the quadrate apex of the telson are seen to be immature, it is possible that at full maturity it may disappear. In two other respects the specimens differ from the form described by Sars. The broad rostrum is somewhat convex on either side at the base, instead of passing with an uninterrupted concave sweep to the apical tooth of the lateral margin, and there are only two pairs of minute dorsal spines on the telson, instead of three, as figured by Sars. These small differences do not seem to warrant the institution of a distinct species, at any rate while the facts of the development remain uncertain.

Length, scarcely exceeding 8 mm. in the largest specimens.

Locality.—Cape St. Blaize, N. 10° W., 33 miles. Specimens abundant in coarse trawl net attached to trawl. Sars in 1885 speaks of the species as being seemingly "restricted to the Australian Seas and those of the Indian Archipelago."

Gen. **Nyctiphanes**, Sars.

1883. *Nyctiphanes*, Sars, Vid. Selsk. Forhandl. Christiania, No. 7, p. 23.
1885. *Nyctiphanes*, Sars, Challenger Schizopoda, Reports, Vol. XIII., p. 114.
1889. *Nyctiphanes*, Gerstaecker, in Bronn's Thierreich, Vol. V., Pt. 2, p. 669.
1893. *Nyctiphanes*, Stebbing, History of Crustacea, p. 263.

Whereas in *Euphausia* both the fourth and fifth pairs of peraeopods are rudimentary, in *Thysanopoda* and *Nyctiphanes*, it is only the fifth pair that is absolutely degraded, but while in *Thysanopoda* the fourth pair resembles those which precede it, in *Nyctiphanes* the terminal three joints are wanting. The flagella in both pairs of antennae are elongate, and in the first pair the first joint carries a peculiar " leaflet " or process reflexed over the eye. The female is characterized by the presence of a double ovisac.

Nyctiphanes australis, Sars.

1883. *Nyctiphanes australis*, Sars, Vid. Selsk. Forhandl. Christiania, No. 7, p. 24.
1885. *Nyctiphanes australis*, Sars, Challenger Schizopoda, Reports, Vol. XIII., pp. 115, 150, Pl. 20, Pl. 21, figs. 1-7, Pl. 28.

The rostrum is triangular, not elongate ; the carapace is without lateral denticles, with the hind margin produced on either side beyond an emarginate central lobe. The eyes are large, pyriform. The outer margin of the first joint in the first antennae is produced into a sharp tooth, and the leaflet has its apex acute, upturned. The scale of the second antennae does not reach the end of the peduncle. The limbs are slender, the third and fourth peraeopods in the female being devoid of an exopod, which in the male they carry. The rudimentary fifth peraeopods consist of a broad basal joint surmounted by another that is slender, curved, obtuse-ended, and soft. The third joint in the appendages from the first maxillipeds to the fourth peraeopods is successively longer ; but in the third peraeopods the terminal three joints, which in the preceding appendages have a combined length greater or not less than that of the fourth joint, fall abruptly short of that length, preparatory as it were to disappearing altogether from the fourth

peraeopods. These gradations seem to negative what might otherwise be a natural suggestion that in the fourth peraeopods not a loss but a coalescence of joints may have occurred. The rounded apex of the telson is transparent.

Length, about 11 mm. in both sexes. Two of the specimens carried eggs, in one example the two longitudinal packets being easily separable.

Locality.—Ten miles off Cape St. Blaize, in 40 fathoms, "where fish were plentiful."

The specimens from which Sars drew his elaborate illustrations reached a length of 17 mm. "in the male sex, in the female somewhat less." After mentioning the localities from which they were obtained, he says:—"The species would accordingly appear to be wholly confined within the limits of the Australian Seas." The South African specimens do not, however, appear to differ in any material respect except size. Sars states that the first two pleon segments have the posterior margin slightly produced in the middle. This production I cannot perceive. The sixth segment has the produced point which Sars figures, but does not mention.

Fam. **Mysidae.**

1885. *Mysidae*, Sars, Challenger Schizopoda, Reports, Vol. XIII., pp. 11, 172.
1887. *Mysidae*, Hansen, Vid. Medd. Kjöbenhavn, p. 209.
1892. *Mysidae*, Norman, Ann. Nat. Hist., Ser. 6, Vol. X., p. 143.
1893. *Mysidae*, Stebbing, History of Crustacea, p. 266.
1893. *Mysidae*, Ortmann, Decap. und Schizop. Plankton-Exp., p. 21.

Ortmann supplies a synoptic view of nineteen of the genera included in this family, defining for the first time *Chlamydopleon* and *Caesaromysis*.

Gen. **Caesaromysis,** Ortmann.

1893. *Caesaromysis*, Ortmann, Decap. und Schizop. Plankton-Exp., pp. 22, 24.

Ortmann gives a definition to the following effect:—

Body plump, spinose. Cephalothorax not completely covering the thorax behind, the rostrum produced, spiniform. Marsupium of the female formed of two pairs of lamellae.

Eyes normal (not lamellar), large, on tolerably long and thin peduncles. Scale of second antenna very short, subulate (not laminar), shorter than the penultimate joint of the peduncle. The second and third maxillipeds and five following pairs of limbs nearly alike, beset with strong setæ. Sixth joint triarticulate, finger well developed. First maxillipeds without exopod. Pleopods in the female rudimentary, in the male all five well developed. Telson small, ovoid, truncate at the end. Inner branch of the uropods shorter than the outer. Auditory organ well developed.

By the reduction of the antennal scale, Ortmann considers that his genus approaches *Anchialus*, Kröyer, and *Arachnomysis*, Chun, the former having the scale laminar, the eyes on short stalks, and the telson apically furcate, whereas in *Caesaromysis*, the scale is subulate, the eyes are on long stalks, and the telson is truncate.

Caesaromysis hispida, Ortmann.

1893. *Caesaromysis hispida*, Ortmann, Decap. und Schizop. Plankton-Exp., p. 24, Pl. 1, figs. 8, 8a, b, c, d, e, f, g, l, z.

A single specimen, male, of this remarkable species fully agrees with the description and figures supplied by Dr. Ortmann, except that the four-spined apex of the telson is less decidedly truncate, and from the base of each of the last pair of legs there is ventrally an obtuse process, about thrice as long as broad, directed backwards, which is not mentioned by Ortmann. The numerous long spines lateral to the rostrum and dorsal on carapace and pleon give the creature a larval appearance. The large swollen eyes, set at right angles to the slender peduncles, with the larger corneal group looking straight forward, and another smaller and quite separate group facing outward on either side, produce a remarkable effect. It is not without a parallel in the young of Euphausiidae, but is perhaps even more closely comparable with the eyes in the Amphipod *Phronima*. The animal, as preserved, is pellucid except in regard to the eyes. The length, from apex of rostrum to apex of telson, is 6.5 mm. The largest male in Ortmann's collection was 9 mm. long.

Locality.—Lion's Head, S. 72° E., 47 miles. Depth, 190 fathoms. Bottom, green sand and black specks. Taken by townet on beam of trawl.

CRUSTACEA ENTOMOSTRACA.

COPEPODA PARASITICA.

Fam. Lernaeidae.

1815. *Lernäen*, Oken, Lehrbuch der Naturgeschichte, Dritter Theil. Zoologie., p. 357.

1832. *Lernäen*, von Nordmann, Mikrographische Beiträge, zweites Heft, p. 49.

1840. *Lernéocériens*, Milne-Edwards, Hist. Nat. Crust., Vol. III., p. 521.

1853. *Penellidae*, Dana, U.S. Expl. Exp., Vol. XIII., p. 1448.

1859 (1862). *Lernaeidae*, Thorell, K. Vet. Akad. Handlingar, Vol. III., No. 8, p. 14.

1865. *Lernaeina*, Heller, Reise der Novara, Crustaceen, p. 244.

1866. *Lernaeidae*, Bate, Zool. Record for 1865, p. 364.

1866–1879. *Lernaeodea*, Gerstaecker, Bronn's Thierreich, Crustacea, Vol. V., Pt. 1, p. 726.

1889. *Lernaeodea*, G. M. Thomson, Trans. New Zealand Inst., Vol. XXII., p. 368.

1899. *Lernaeidea*, Bassett-Smith, Proc. Zool. Soc. London, pp. 441, 480.

Oken, who makes the Lernaeidea a "Sippschaft" of the "Armwürmer," gives the following definition of the family :— "Leib walzig und unförmlich, kein Unterschied zwischen Brust und Bauch, hinten meist freie Eierschnüre, geiselförmig oder als Saum einer Haut, keine Stummelfüsse, keine Fühler, keine Augen, kein Rückenschild, Schmarotger." The modern definition is given in Mr. Bassett--Smith's exceedingly useful summary. That summary, however, is limited to the genera and species parasitic on fishes. It does not, therefore, mention *Ive balanoglossi*, Mayer, or *Pennella balaenopterae*, Koren and Danielssen. It may be added that, according to Richiardi, Atti. Soc. Toscana, Vol. II., p. 190, 1876, Cornalia's *Taphrobia pilchardi*, described in Atti Soc. Ital. Sci. Nat., Vol. XVIII., fasc. 2, p. 197, is identical with, but of later date than Heller's *Peroderma cylindricum*. It should also be noted that in 1864 Kröyer described a genus *Therodamas*, not *Therodamus*.

Gen. **Pennella**, Oken.

1815. *Pennella*, Oken, Lehrbuch der Naturgeschichte, Dritter Theil. Zoologie, p. 357.
1822. *Lernæopenna*, de Blainville, Principes d'Anatomie comparée, Vol. I., Tab. 7.
1830. *Pennella*, Cuvier, Règne Animal, Vol. III., p. 256.
1832. *Pennella*, von. Nordmann, Mikrograph. Beiträge, zweites Heft, pp. 52, 121.
1840. *Penellus*, Milne-Edwards, Hist. Nat. Crust., Vol. III., p. 522 (*Penella*, p. 632).
1853. *Penella*, Dana, U.S. Expl. Exp., Vol. XIII., p. 1448.
1860. *Baculus*, Lubbock, Trans. Linn. Soc. London, Vol. XXIII., Pt. 1, p. 190.
1861. *Pennella*, Steenstrup and Lütken, K. Danske Vid. Selsk. Skr., Ser. 5, Vol. V., p. 408.
1864. *Pennella*, von Nordmann, Bull. Soc. Imp. Moscou, Vol. XXXVII., p. 485.
1865. *Pennella*, Heller, Reise der Novara, Crustaceen, p. 244.
1876. *Pennella*, Richiardi, Atti. Soc. Toscana, Vol. II., p. 190, Vol. III., p. 198.
1883. *Hessella*, Brady, Challenger Copepoda, Reports, Vol. VIII., p. 136.
1889. *Penella*, Thomson, Trans. New Zealand Inst., Vol. XXII., p. 368.
1895. *Pennella*, Mrázek, Sitzungsber. Böhmisch. Gesellsch., Art. 44, 1895.
1899. *Penella*, Bassett-Smith, Proc. Zool. Soc. London, p. 482.

Oken gave the following definition :—" Pennella ; Leib walzig, hinten gefiedert nebst zwei langen Eierschnüren, Kopf kolbig, abgestutzt, mit zwei knorpeligen, graden Hörnern nach hinten." With this may be compared the definition supplied by Mr. Bassett-Smith :—" Head large, globose, tuberculate, with arm-like projections directed backwards ; the neck is long and straight, not distinctly segmented, united with the elongated genital segment in the same line. Abdomen penniform. Four pairs of limbs are present, placed close behind the head and together ; the first two are biramose, the third and fourth uniramose, each branch with two joints. Male minute, not elongated."

The feathered termination of the body sufficiently explains the generic name, and makes the variation in spelling less easy to account for.

In *P. crassicornis*, Steenstrup and Lütken, and in *P. histiophori*, Thomson, the arm-like processes behind the head are

represented as directed at right angles to the body, not backward. In adult stages the limbs appear to become quite rudimentary. Steenstrup and Lütken think it probable that the description of the male given by Milne-Edwards is not derived from his own observation, but based on a misapprehension of von Nordmann's figure of the male of an *Anchorella*.

Richiardi states that Milne-Edwards' *Lernaconema Lesueuri* (*Lernæopenna Blainvillii ?* Lesueur) is only a young individual of *Pennella Blainvillii* (Lesueur). Similarly Mrázek has decided that *Hessella cylindrica*, Brady, and *Baculus elongatus*, Lubbock, belong to the genus *Pennella*, being young forms of the female. He points out that Lütken already in 1892 had advanced this opinion in regard to *Baculus*, and that Thomas Scott in 1894 had suggested that Brady's species was probably identical with Lubbock's. Bassett-Smith makes *P. blainvillii* a synonym of *P. exocoeti* (Holten), 1802, in opposition to Steenstrup and Lütken, who consider them very distinct.

Linnaeus, in the Systema Natura, Ed. 10, Vol. I., p. 819, 1758, gave the following account of his *Pennatula filosa* :—

"P. stirpe rachi utrinque pennata; basi tentaculis duobus.

"*Bocc. mus.* 1674, p. 286. *t.* 286.

"*Habitat in* M. Mediterranei *Xiphiis.*

"*Setæ* 2, *rubrae, ad basin rachios pennatae insertae, ipsaque rachi longiores.*"

The two setæ are evidently the filiform ovigerous tubes. Cuvier, Règne Animal, Vol. III., p. 257, still in 1830 retains the species among Zoophytes, in "Les cavitaires," first order of "Les Intestinaux." To his definition of *Pennella* he adds, "Il y en a dans la Mediterranée une espèce (*Pennella filosa* : *Pennatula filosa*, Gmel.) Boccone, Mus., 286, Ellis, Trans. phil., LXIII., xx., 15, longue de sept à huit pouces, qui pénètre dans la chair du xiphias, du thon, de la mole, et les tourmente horriblement." But as yet there seems to be no evidence and no particular probability that it is the same species which infests all the fishes here named. Steenstrup and Lütken say, "Should several approximate species prove to have been confused under the old name *P. filosa* (Linn.)—which is easily possible—we may remark that the Mediterranean *Pennella* from the sword-fish must be regarded as the type of the species." The description given by Linnaeus can scarcely be said to have any specific value, apart from the name of the host, so that no injury is done him by leaving his specific name in abeyance until a *Pennella* infesting a Xiphias has been again observed. For the parasite of the sunfish an appropriate name is available, which appears to have escaped recent attention.

Pennella orthagorisci, Wright.

1829-1843. *Pennella filosa*, Guérin-Méneville, Iconographie du Règne Animal, Zoophytes, p. 11, Pl. 9, fig. 3.
1870. *Pennella orthagorisci*, Wright, Ann. Nat. Hist., Ser. 4, Vol. V., p. 43, Pl. 1.
1893. *Penella filosa* (part), Bassett-Smith, Proc. Zool. Soc. London, p. 483.

Guérin-Méneville, who follows Cuvier in the classification of this genus, does not specify the fish from which his undescribed figure of the species was taken. Steenstrup and Lütken observe that all the large individuals of *Pennella*, which the Copenhagen Museum in heir day possessed from Orthagoriscus-like fishes, had three horns, whereas Guérin's figure seems to represent a two-horned animal. Guérin's figure certainly shows no indication of a third post-cephalic process, nor is there any in the specimen with which we are now concerned. In sending it, Dr. Gilchrist wrote as follows :—" It was found imbedded in the tissue at the base of the dorsal fin of a sun fish (Orthagoriscus mola) caught in Table Bay. The colourless half of the animal was imbedded, the coloured part with the attached barnacle being free. The bend wh ch you will observe was quite the same when cut out from the flesh of the sun fish. The head with the two barb-like projections was in a small pocket of abnormal tissue."

The correspondence with Guérin's figure is too close to admit of any doubt as to the specific identity. At the same time the proportions do not exactly agree. The part answering to the imbedded " neck " is in his figure only an inch and three-fifths long, the remainder two inches and a third, giving with the head a total of four inches. In the South African specimen the " neck " is two inches and a third in length, the remainder two nches, the total four inches and a half. In each case the penniform abdomen is about three quarters of an inch long, but Guérin represents the filaments as more thread-like than they are in our specimen, and without the branching which can, upon close inspection, be seen in the latter, in some correspondence with the figure assigned by Steenstrup and Lütken to *P. filosa*. The specimen described by Dr. E. P. Wright, which was taken in 1869 from an *Orthagoriscus mola* in Cork Harbour, had a total length of seven inches, the thoracic region being five inches and three quarters long. The cephalic horn-like appendages were each an inch and a half in length, and the ovisacs eleven inches long. Figure 6 on Dr. Wright's plate is explained as " Head of second specimen, showing the compara-

tively short horns." This specimen was from the same sun fish, so that there can be no reasonable doubt that it is of the same species as the long-horned specimen. To judge by the parallel case of *Sphyrion laevigatum*, these deeply-imbedded parasites vary greatly from specimen to specimen in the measurement of their imbedded parts.

Dr. Wright in his description mentions an eye-spot, in which he could find no appearance of a corneal structure or of the three cornea-like portions described by Claus for a species of *Pennella* (Beobachtungen über *Lernaeocera*, *Peniculus* und *Lernaea*, 1868). He further mentions a pair of minute antennules, antennae obscurely three-jointed, with the "distal joint cheliform," and surrounding the oral opening a number of small cauliflower excrescences. The chelate second antennae are figured for their *Pennella varians* by Steenstrup and Lütken, by Lubbock for the juvenile *Baculus elongatus*, and by Brady for the likewise juvenile *Hessella cylindrica*.

In the specimen from Table Bay the head is not very large, globular, with a circular group of close-set tubercles round the mouth opening. The blunt arms are directed slightly backwards, and are not much longer than the diameter of the head. On the "neck" between the arms are the four pairs of microscopical pointed processes representing the limbs. Attached at the point where the pale imbedded part of the specimen meets the brownish purple free portion is a specimen of *Conchoderma virgatum* (Spengler), of which some juvenile examples are attached at the other extremity of the genital segment, adjacent to the ovigerous tubes. It is said that *Pennella balaenopterae*, Koren and Danielssen, attached to a *Balaenoptera rostrata* (Fabr.) on the coast of Norway was also found associated with this same Thyrostracan species (Zool. Record for 1877, Crustacea, p. 34). The pale "neck" near the centre has four or five more or less joint-like constrictions. The dark part is rugose with close-set circular ridges, which are in part finely tuberculate. The ovigerous sacs were broken.

The resemblance which the free part of this copepod bears to a sea-feather is quite striking enough to explain its inclusion by Linnaeus in the genus *Pennatula*. Probably there are very few marine animals that care to feed on Alcyonarians compared with the number to which crustaceans are palatable. It may therefore be presumed that the resemblance of the *Pennella's* exposed part to a *Pennatula* is protective, and that the attached barnacles also profit indirectly by a disguise which was at least artful enough to deceive Linnaeus.

[Published 20th February, 1905.]

PLATES

AND

EXPLANATIONS OF PLATES.

The Plates are numbered consecutively to those of "South African Crustacea," Part II.

Plate XVII.

Dynomene platyarthrodes, n. sp.

n.s. Dorsal view of female, natural size.

oc., a.s., a.i., mxp. 3. Ventral view of head, showing the rostrum, epistome, eyes, first and second antennae, and one of the third maxillipeds; flagella of second antennae omitted.

f.s. Sternal sulci of the female between the bases of the first four peraeopods; the genital openings seen on the bases of the third peraeopods.

Pl. D. Dorsal view of the last three segments of the pleon.

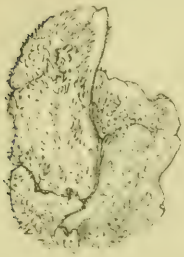
T.V., urp. Ventral view of telson and uropods.

mxp. 2, mxp. 3. Second and third maxillipeds.

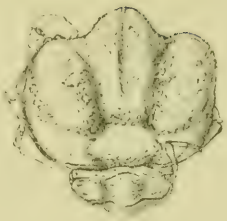
prp. 1, 3, 4, E. and I. First peraeopod or cheliped, and third and fourth peraeopods, each viewed from the exterior surface (E.), and from the adpressed surface (I.).

prp. 5. Fifth peraeopod, seen from the outer surface, as lying on the back of the carapace.

urp. Uropod or platelet of sixth pleon segment, ventral view, greatly magnified.



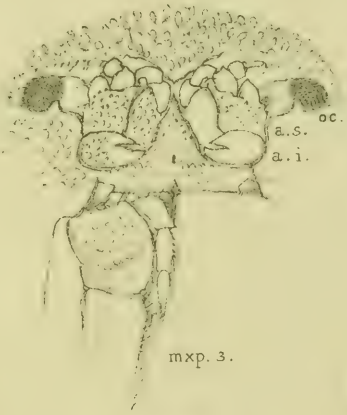
prp. 1. E.



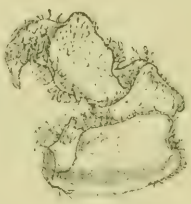
n. s.

prp. 1. I.

prp. 4. I.



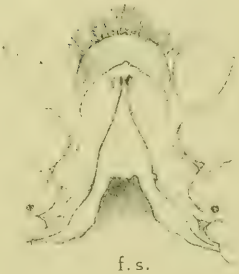
mxp. 3.



prp. 3. I.

prp. 4. E.

prp. 3. E.



f. s.

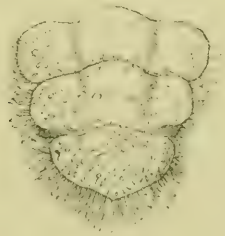
mxp. 3.

mxp. 2.

urp.

urp

T.V.



Pl. D.

prp. 5.

Plate XVIII.

Exodromidia spinosa (Studer).

n.s. Dorsal view of male specimen, natural size.

Pl. D. Dorsal view of pleon magnified, from a smaller male specimen; some of the setæ omitted on the left side.

Pl. V., s. 1–4. Ventral view of the first four segments of the same pleon, showing on the left of the figure the first pleopod, and on the right the second.

T. Ventral view of fifth and sixth segments and telson of the same pleon, showing the rudimentary pleopods.

Pl. V., s. 3, 4. Ventral view of third and fourth pleon segments more highly magnified, and showing on one side the rudimentary pleopods.

mxp. 1, mxp. 2. The first and second maxillipeds.

plp. 1, 2. The first and second pleopods of the smaller male specimen, from which all the detail figures have been drawn.

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J.T. Rennie Reid, Lith. Edin.

EXODROMIDIA SPINOSA (Studer).

Plate XIX.

Neolithodes capensis, n. sp.

dar. n.s. ♀. The carapace of the female in dorsal view, natural size. Some of the spines on the branchial regions are represented in a much less upright position than they really occupy, the better to indicate their actual size.

a.s. ♀. A profile from the left side of the female, showing the three rostral spines, two of those on the gastric region, and the external orbital spine with the adjacent eye and first antenna.

a.s. ♂. A profile view of the same parts from the right side of the male.

Del. T.R.R. Stebbing

J.T Rennie Reid Lith. Edin.r

NEOLITHODES CAPENSIS, n.sp.

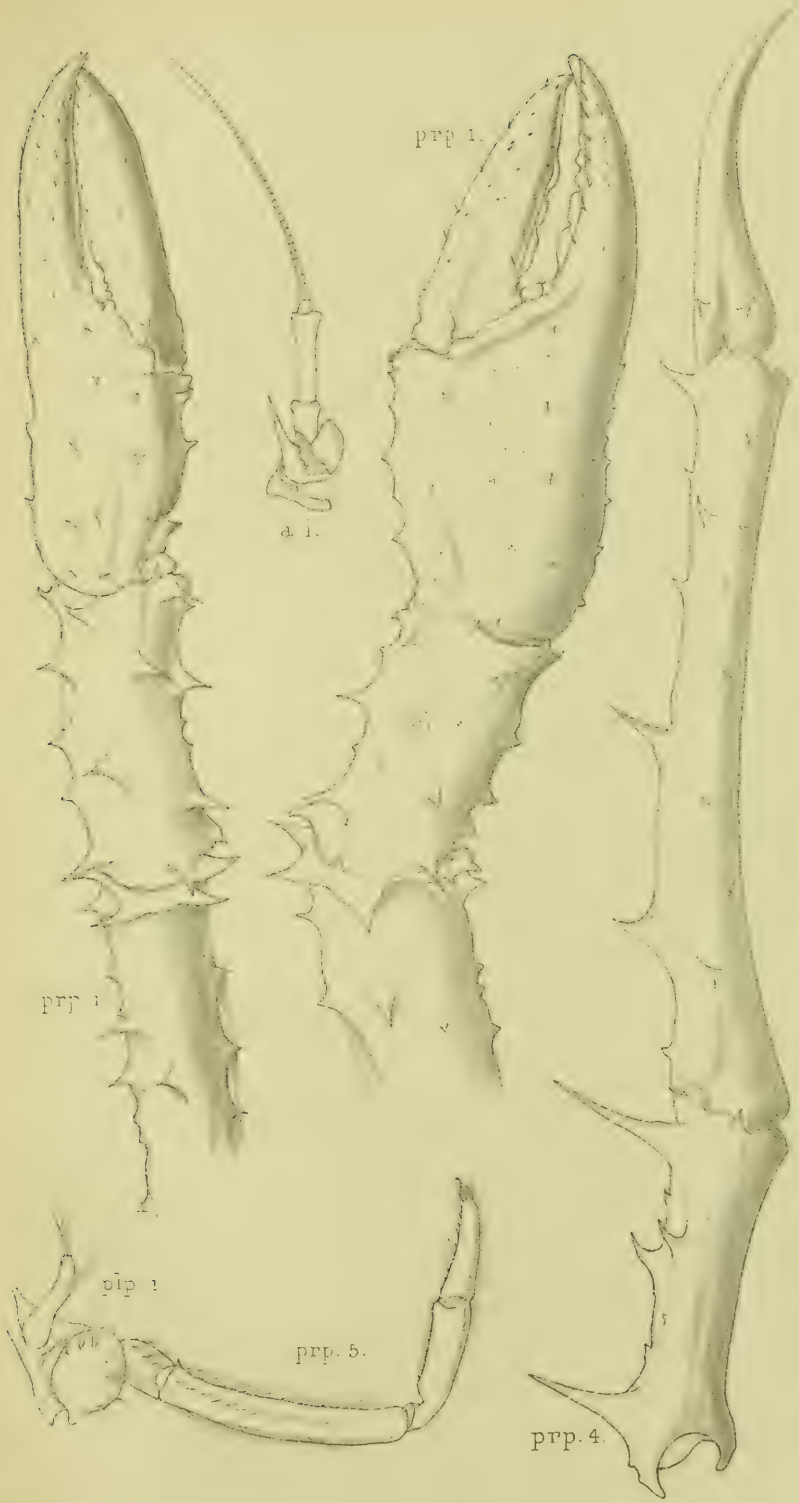
Plate XX.

Neolithodes capensis, n. sp.

a.i. The second antenna, natural size.

prp. 1. The figure on the right represents the right cheliped, natural size, from the distal part of the fourth joint to the end. Similarly, the figure on the left represents the same joints of the left cheliped, in both cases from the upper surface.

prp. 5, plp. 1. The fifth peraeopod and the first pleopod, natural size. All the figures on this plate are from the female.



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J. T. Rennie Reid, Lith. Edin^r

NEOLITHODES CAPENSIS, n. sp.

Plate XXI.

Penaeus caeruleus, n. sp.

A.n.s. Lateral view of a specimen, natural size; the apices of the rostrum and telson a little imperfect. The magnified details are from this specimen, with the exceptions indicated below.

oc. Outline of the eye.

m., mx. 1, mxp. 2, mxp. 3. Mandible, first maxilla, second and third maxillipeds.

prp. 1, prp. 3. First and third peraeopods, with seta and epipod of the latter more highly magnified.

plp. 1. First pleopod with petasma, more highly magnified than the peraeopods.

pet. Petasma of the first pleopod, in lateral view, greatly magnified.

B. car. Carapace of a smaller specimen, in lateral view, magnified to two diameters.

B. urp., T. Telson and uropods of the last mentioned specimen, in dorsal view, similarly magnified.

C. th. Thelycum of a third specimen, female, in ventral view.

Plate XXI bis.

Penaeus caeruleus, n. sp.

The figures correspond with the natural size of the specimen.

A dorsal view is given of the carapace, showing also the eyes, the first antennae, and the second antennae as far as the earlier joints of the flagella.

The tail-fan, composed of the telson and uropods, is also shown in dorsal view.

In the complete lateral view of the specimen the flagella of both members of the second antennae are exhibited, but of the other paired appendages in each case only one member appears.

The colouring, though copied from a preserved specimen, is believed to agree with that of the living animal.

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J. T. Rennie Reid, Lith. Edin.

PENAEUS CAERULEUS, n. sp.

E.C. Knight del.

West, Newman chr. London.

PENAEUS CAERULEUS, n. sp.

Plate XXII.

Sergestes gloriosus, n. sp.

n.s. Lateral view of specimen, natural size, from the right.
r. Lateral view of rostrum, from the left.

o.l. Row of luminous organs from near to the left lateral margin of carapace, with one of the series more highly magnified.

oc. D., oc. V. The eye in dorsal and ventral view.

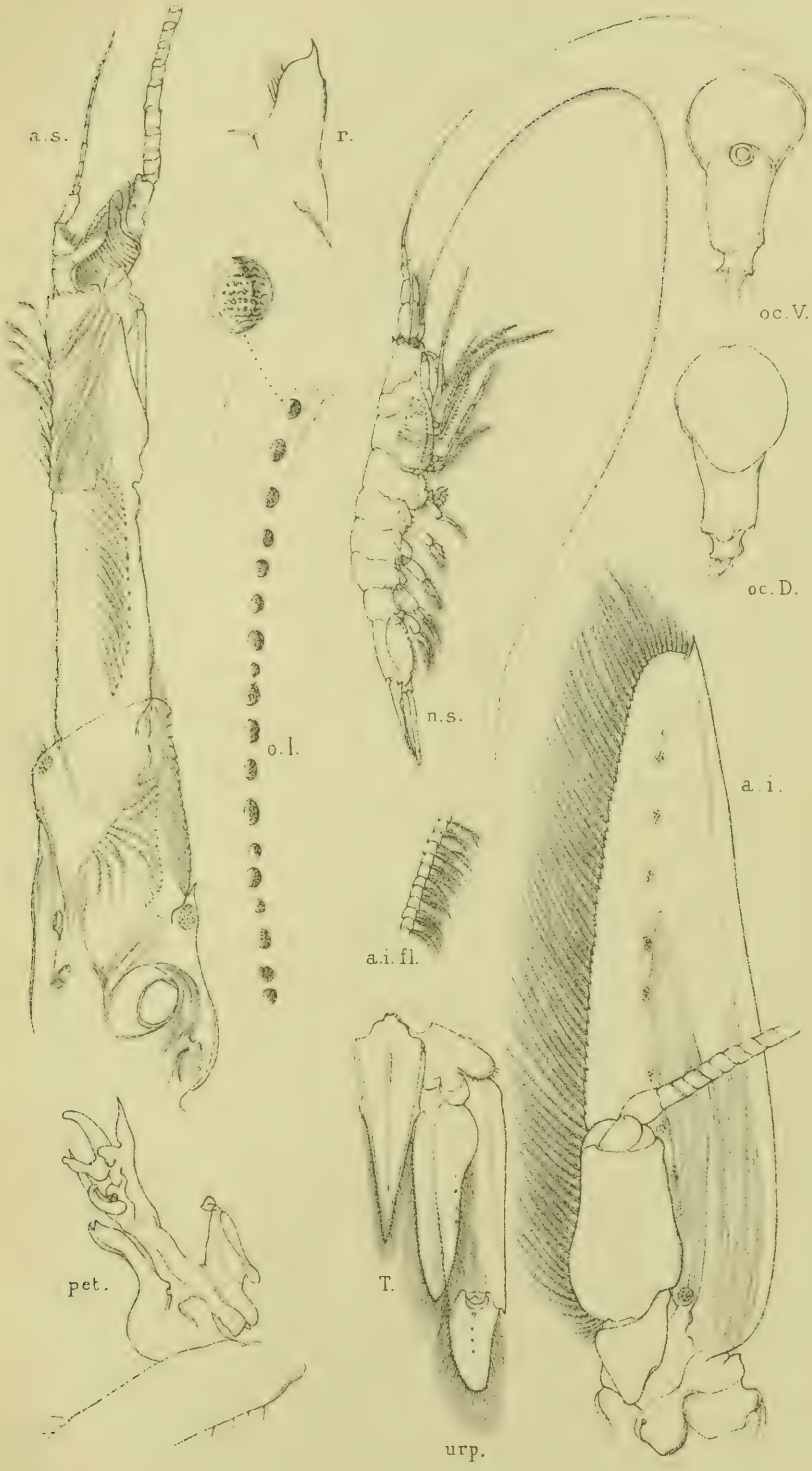
a.s. Upper antenna, curtailed so that only a few joints of the longer flagellum are shown.

a.i. Lower antenna, the flagellum almost entirely omitted.

a.i.fl. A small portion from middle part of flagellum of lower antenna.

pet. Lateral view of the petasma on base of first pleopod.

T., urp. Dorsal view of telson and right uropod. These parts are magnified, but on a much lower scale than the remaining detail figures.



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SERGESTES GLORIOSUS, n. sp.

Plate XXIII.

Sergestes gloriosus, n sp.

mxp. 1. First maxilliped, the lower part of the epipod omitted.

mxp. 3, prp. 5. Base of third maxilliped, and fifth peraeopod complete, with base of fourth peraeopod above it. The series of branchiae comprises in descending order one each for the second and third maxillipeds and for the first and second peraeopods followed by two apiece for the third and fourth peraeopods.

prp. 1. Distal part of the first peraeopod, showing the prehensile spines at junction of the fifth joint with the sub-divided sixth.

prp. 2. Second peraeopods, distal portion.

prp. 3. Third peraeopod, part, to show the numerous organs on the fourth joint.

pet. Petasma, front view.

retin. plp. 2. Retinaculum or coupling process from inner ramus of second pleopod.

o.l. Luminous organs, the upper figure from ventral surface of first pleon segment, the lower from the anterior part of the carapace.

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SERGESTES GLORIOSUS, n. sp.

Plate XXIVa.

Sergestes bisulcatus, Wood-Mason.

n.s. Lateral view of specimen, natural size, flagella of antennae wanting.

a.s., prp. 3, 4, 5. Lateral view of anterior part of another specimen, enlarged about two diameters, showing parts of the flagella of the upper antennae, and relative extension forward of eyes, scale of second antenna, second and third maxillipeds, and the peraeopods.

r. Rostrum highly magnified.

prp. 1, 2. Terminal portions of first and second peraeopods, with the prehensile spines of the first, and the chela of the second still more highly magnified.

Plate XXIVb.

Acanthephyra batei, n. sp.

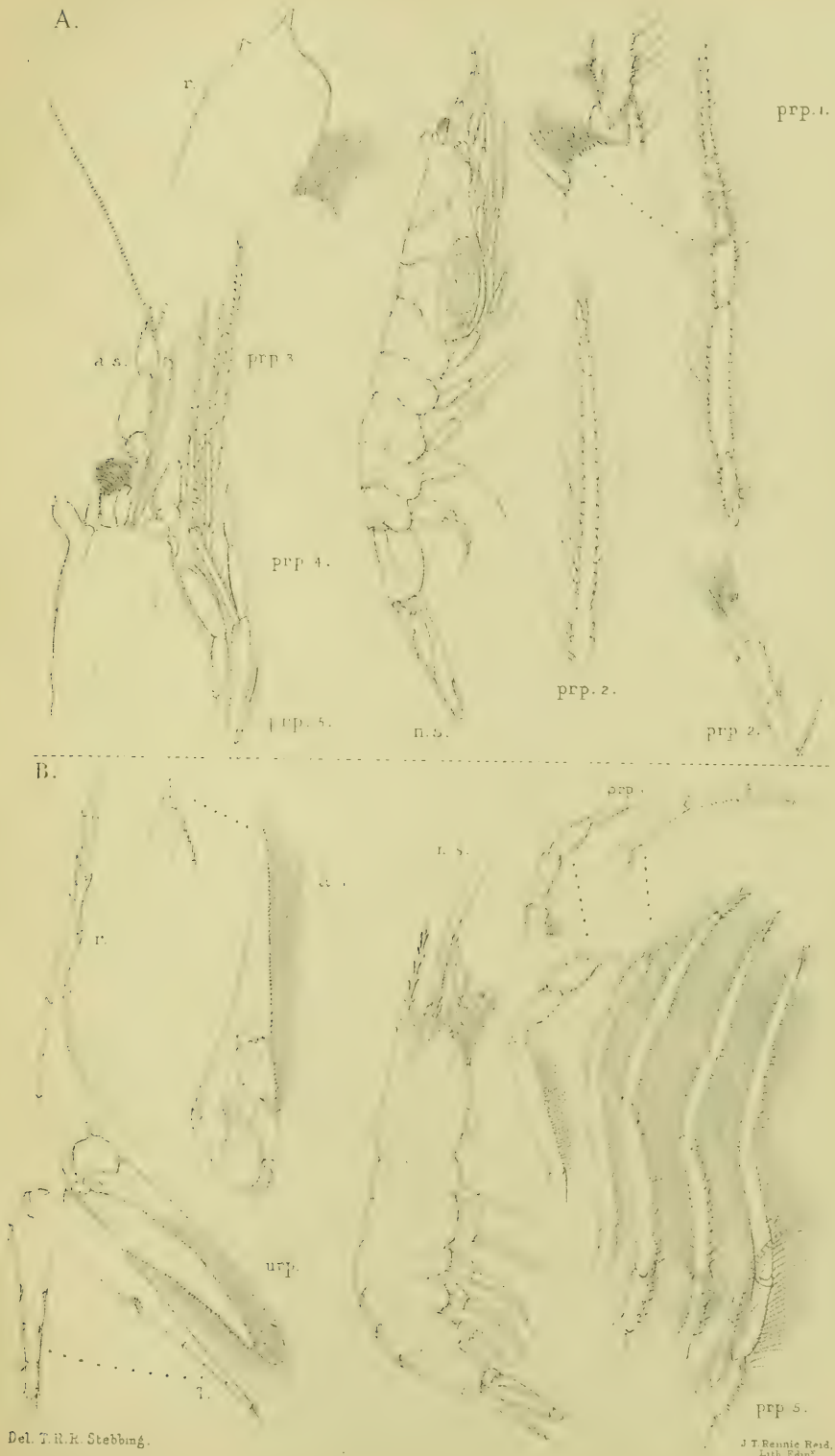
n.s. Lateral view of specimen, natural size, flagellum of second antenna wanting.

r. Rostrum magnified, lateral view.

a.i. Second antenna magnified, without the flagellum; with apex of the scale more enlarged.

prp. 1–5.. The five pairs of peraeopods magnified, in their relative positions but the base and exopod shown only in prp. 5. The apical joints of the chelipeds also shown separately, to make clear the comparative length of the fingers.

T., urp. Lateral view of telson and uropod magnified, and dorsal view of distal part of telson.



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J.T. Rennie Reid, Lith. Edin.

A. SERGESTES BISULCATUS, W.M. B. ACANTHEPHYRA BATEI, n. sp.

Plate XXV.

Pontophilus gracilis, Smith.

n.s. Lateral view of a specimen, natural size.

car. Lateral view of carapace, with eye, greatly magnified.

T., urp. Dorsal view of telson, with figure of apex still more magnified; the uropods of one side in position, the inner ramus imperfect.

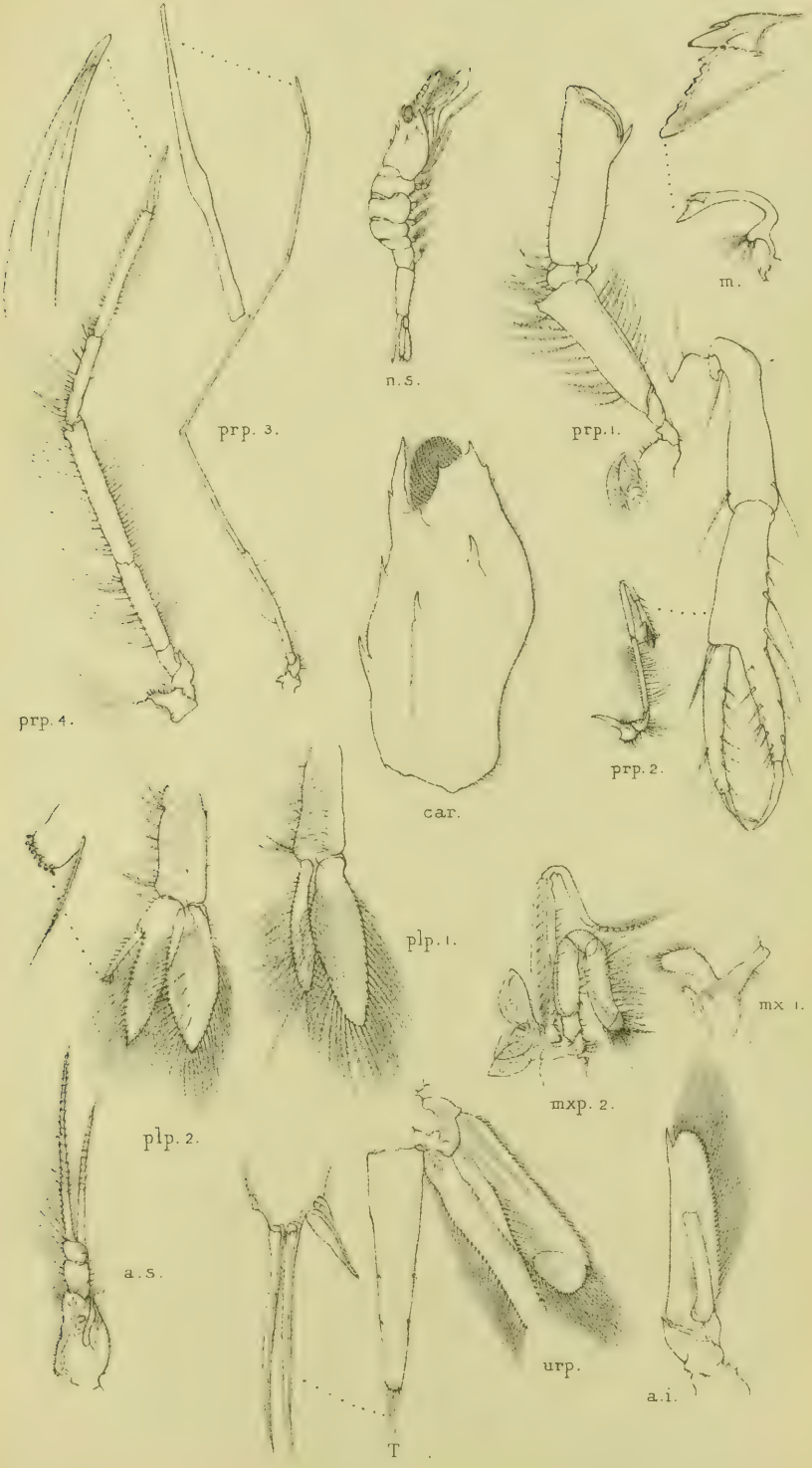
a.s, a.i. First antenna, and part of second.

m. Mandible, with distal portion more magnified.

mx. 1, mxp. 2. First maxilla, and second maxilliped.

prp. 1, 2, 3, 4. First four peraeopods, with more highly magnified portions of the second, third and fourth.

plp. 1, 2. First and second pleopods, apex of retinaculum more highly magnified.



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PONTOPHILUS GRACILIS, Smith.

Plate XXVI.

Leontocaris paulsoni, n.g. et sp.

n.s. Lateral view of a male specimen, natural size. The details are also from the male.

Fr. Part of front in dorsal view, magnified.

r. Rostrum magnified.

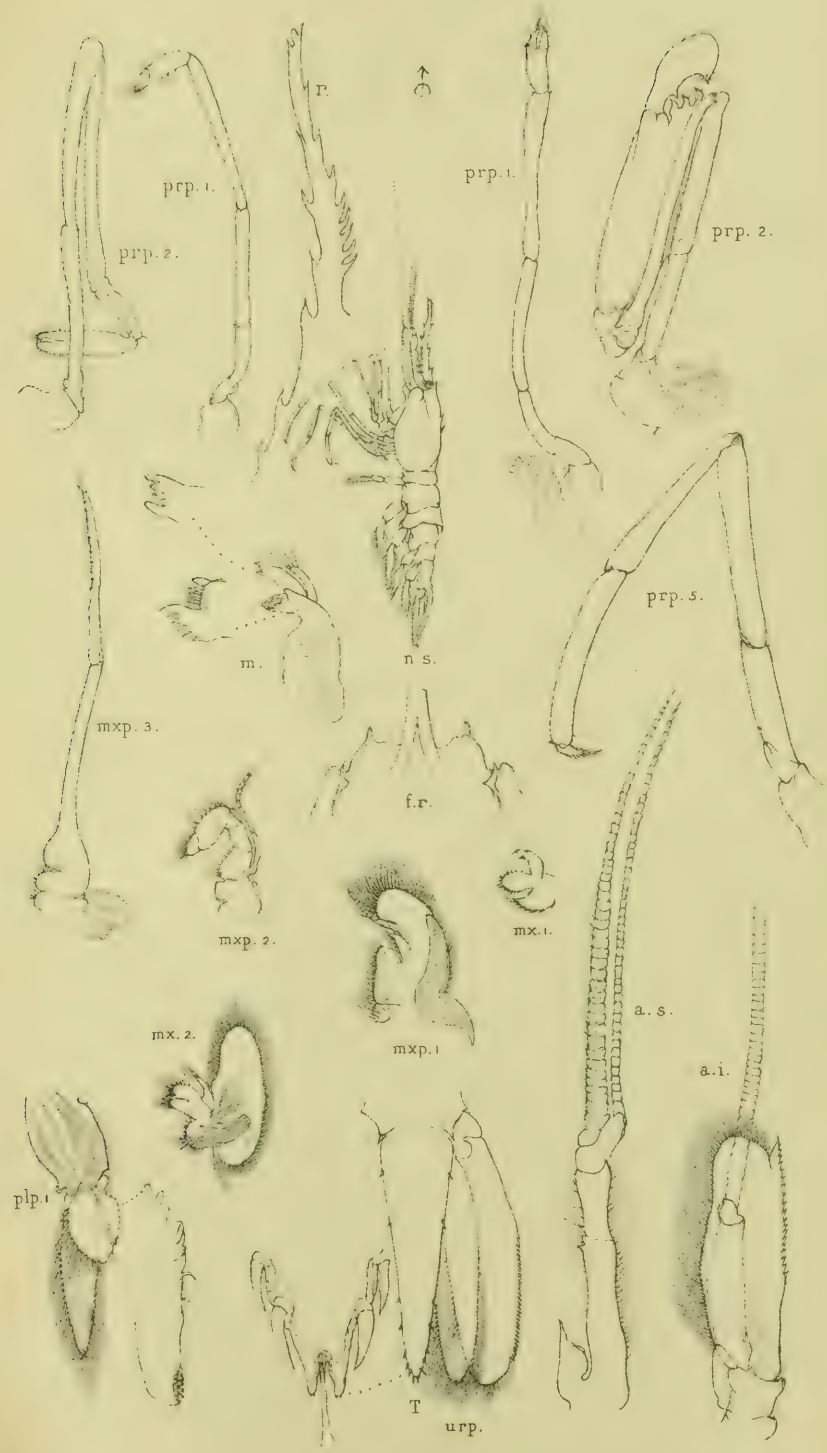
T., urp. Telson and one of the uropods in dorsal view; apex of telson more highly magnified.

a.s., a.i. First antenna, and part of second.

m., mx. 1, mx. 2, mxp. 1, mxp. 2, mxp. 3. Mandible, with parts more highly magnified, first and second maxillae, first, second and third maxillipeds. The mandible is figured on rather a larger scale than the other mouth-organs.

prp. 1, 2, 5. First, second, and fifth peraeopods, including both members of the first two pairs.

plp. 1. First pleopod, with retinaculum more highly magnified.



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LEONTOCARIS PAULSONI, n. g. et. sp.

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THE PLANKTON

OF

THE SOUTH AFRICAN SEAS.

BY

P. T. CLEVE.

II.—VERMES.

A. Annelida.

Tomopteris (? **onisciformis**), Escholz.

West Coast : Lion's Head, N. 63° E., 34 miles, 62 metres (34 fath.) 19.iv.1900, rare.

Agulhas Bank : From Cape Infanta to Mossel Bay 55 to 75 metres (21-42 fath.), very abundant in the months of June, July and October.

Remarks.—As the value of the characteristics upon which a number of "species" of Tomopteris (as *T. helgolandica*, *T. quadricornis*, *T. vitrina*, *T. scolopendra*) have been founded is very questionable (compare Carpenter and Claparède, T. Lin. Soc., Lond., xxiii., p. 59, 1860, and Fowler Proc. Zool. Soc., Lond., 1897, p. 523) I dare not decide whether the South African Tomopteris is identical with or different from the North Atlantic form. Compared with specimens from the Skagerak, the African specimens are more delicate and smaller (largest specimens with developed tail, 1 centimetre only ; the Skagerak specimens attain the length of 2 centimetres). As far as I can see all specimens from the South African seas belonged to one and the same species.

Geogr. Distr.—Tomopteris onisciformis has been found on the northern hemisphere in the English Channel (Intern. Cooperation), W. of England (Hornell), Arran (Carpenter and Claparède), Färœ Channel (Fowler), Firth of Forth (Henderson), Northern North Sea (various authors), Dogger Bank (Möbius), Skagerak and Kattegat (various authors).

If *Briarœa scolopendra* (Quoi and Gaim.) and *Tomopteris vitrea* (Veidovsky) be the same as *T. onisciformis* it occurs also in the Southern Indian Ocean and in the Adriatic.

The National Expedition (Apstein: Die Alciopiden und Tomopteriden der Plankton-Expedition P.xii.1900. Ergebnisse B.ii. H.b.) found *T. helgolandica* (*T. onisciformis*) besides in the North Sea and around the British Islands, also above the Newfoundland Banks, in the mouth of the river Parà and in the Sargasso Sea at about 30°N. 30°W. Apstein mentions it also from Triest.

B. *Chætognatha.*

As the reader will find full information about the literature in the papers of *Strodtmann* (Die Systematik der Chætognathen, Berlin, 1892 Diss, in the following signed S:n) and *Steinhaus* (Die Verbreitung des Chætognathen in Südatlantischen und Indischen Ozean, Kiel 1896 Diss., in the following signed S:s.) I consider it superfluous to quote the literature for the different species.

Krohnia hamata (Möbius).

East Coast: Port Shepstone, N.W. by W. $\frac{3}{4}$ N., 12 miles, 900 metres (500 fath.), 5.iv.1901, one single specimen.

Geogr. Distr.—41° S. 9° E., in the Westwind Drift 70 metres (Chun, S:s). South Equatorial Current, Guinea Current and the Sargasso Sea, in depths of 600 to 1,500 metres (S:s). From the south end of Greenland to Scotland, and at 50° N. 49° W. (S:n.). Northern Atlantic in depths of 100 metres and more to 74° N. 18° W. and 80° N. 10° E. (C:e, Aurivillius). Skagerak, usually in depths of 100 to 600 metres (C:e).

Sagitta bipunctata, Quoi and Gaim.

West Coast: Lion's Head, N.84° E., 38 miles, about 350 metres 16.iv.1900, very common.—*Agulhas Bank* from False Bay to Mossel Bay, 36 to 75 metres, April to July, October very abundant.

Geog. Distr.—Peru Current, Austral. Current, N.W. of Sumatra (S:s). Malay Archip. (C:e). S. China Sea (Levinsen). Bay of Bengal, Ceylon, Red Sea, Somali Coast, S. of Madagascar, S. of the Cape Colony, W. of the Benguela Current, Gulf of Guinea, Brazil Current, South Equatorial Current, Sargasso Sea (S:s). Florida Current, 37°-42° N. 60°-57° W., and from 60° N. 22° W. to Scotland (S:n). Between the Azores and the Bay of Biscay to Southern Iceland, the Faröes, West Norway, Skagerak, Kattegatt and the Southern Baltic at Bornholm, but in the latter place only in the deepest layers (C:e and others).

Sagitta enflata (Grassi).

Agulhas Current : From Cape Natal to about 33° 6′ S. 27° 56′ E., 0-97 metres, April and December, common.

Geogr. Distr.—Australian Current and off Sumatra (S:s). Malay Archip. (C:e). Bay of Bengal, Somali Coast, Red Sea, S. of Madagascar, S.W. of the Cape Colony, Gulf of Guinea, Brazil Current, South Equatorial Current, most abundant W. of Africa, N. of South America (S:s). Madeira (Grassi). Mediterranean (Grassi).

Sagitta furcata, Steinhaus.

West Coast : Lion's Head, N. 63° E., 34 miles, 277 metres, 19.iv.1900, very rare.

Agulhas Current : Port Shepstone, N.W. by W.¾ N., 12 miles 900 metres 5.iv.1901, very rare.

Geogr. Distr.—South Equatorial Current and the Sargasso Sea, 500 to 800 metres (S:s).

Sagitta magna, Langerhans.

West Coast : Lion's Head, N. 63° E., 34 miles, 277 metres 19.iv.1900, one specimen only.

Remarks.—The specimen measured in length 4 centimetres, in thickness 3 millimetres, tail ⅙ of the total length ; epidermis thin, the whole animal soft and transparent. Spermatic openings not projecting. Caudal fin entire. Two distant pairs of lateral fins. Head with five pairs of prehensile claws with smooth edge. Anterior teeth 3, posterior 2.

The prehensile claws are, according to Langerhans, 7 to 9, and the anterior teeth 4, the posterior teeth 2-3, according to Grassi.

The *Sagitta tricuspidata,* Kent, measures in length 3½ centimetres, has 8 prehensile claws, 3 anterior teeth and 1 posterior tooth.

Geogr. Distr.—Madeira (Langerhans), Mediterranean (Grassi).

Sagitta serrulata, n.sp.

Diagn.—Body 1 centimetre in length ; tail ¼ of the total length. Epidermis thick, musculature coarse and strong, especially in the posterior part, the animal therefore somewhat rigid in preserved state. Seminal openings prominent. Caudal fin entire ; two distant pairs of lateral fins. Prehensile claws in 6 (or 5-7) pairs, with denticulate edge. Anterior teeth 10, posterior teeth 20.

Remarks.—There is only one species with denticulate prehensile claws known, viz., *S. serratodentata* (Krohn). It differs in larger size (1,5 centimetres), thin epidermis and smaller number of teeth (anterior about 7, posterior about 11).

East Coast : Lion's Head, 76° E., 28 miles, 250 metres 6.iv. 1900, very rare.

Agulhas Current : Cape Natal, N. by E., approximate 24 miles 780 metres 4.iv.1901, very rare ; Port Shepstone, N.W. by W. ¾ N., 12 miles, 900 metres, 5.iv.1901, very rare ; S.E. Coast about 33° 7′ S. 27° 56′ E., 71 metres 30.xii.98, very rare.

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THE PLANKTON

OF

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BY

P. T. CLEVE.

III.—HALOCYPRIDÆ.

The identification of the following species has in most cases been carried out by means of the monograph of *Claus:* Die Halocypriden d. Atlant. Ocean and Mittelmeeres, Wien, 1891. Other papers consulted will be quoted in the following:—

Conchoecetta acuminata, Claus (1891; *Halocypris elongata,* T. Scott, 1894. T. Lin. Soc. Lond. (2) VI. Zool., p. 141, Pl. xv., figs. 1, 2, 27, 30).

Agulhas Current.—Cape Natal, W. by N. 6½ miles, 97 m., 14.xii.00, *rr.*

G. D.—Philippine Islands (Brady), Gulf of Guinea, 4° N.–4° S., 8° W.–10° E., 35–90 m. (T. S.); Canaries, surface, 34°–32° N., 16°–17° W., 500–1000 m. (Claus), 42° N., 42° W. (G. Andersson).

Conchoecia bispinosa, Claus. *West Coast.*—Lions Head, N. 63° E., 34 miles, 277 m., 19.iv.00, *rr.;* Table Mountain, N. 79° E., 40 miles, 450 m., 18.iv.00, *rr.*

Agulhas Current.—Cape Natal, N. by E., 24 miles, 780 m. 4.iv.00, *r.;* Port Shepstone, N.W. by W. ¾ N., 12 miles, 530–900 m., 5.iv.01, *r.*

G. D.—Madeira, surface, 38° N. 14° W., 1500 m. (Claus); 42° N. 42° W., surface (G. Andersson); 33° N. 36° W. and 37° S. 133° W. (Brady).

Conchoecia haddoni, Brady and Norman. Trans. R. Dublin Soc. (2), V., p. 690, Pl. lxiv., figs. 6–16, 1896).

Agulhas Current.—Port Shepstone, N.W. by W. ¾ N., 12 miles, 530 m., 5.iv.01, *rr.*

G. D.—Off "Achill Head," 40 miles, Ireland, 350 m. (Brady).

Conchoecia magna, Claus (*C. tetragona*, G. O. Sars).

Agulhas Current.—Port Shepstone, 530–900 m., 5.iv.01, *r.*

G. D.—1° S., 100° W., and 19° N., 173° E. (G. W. Müller); Gulf of Aden, surface (C : e), 3°N. 26° W. (G. W. Müller); Mediterranean (Claus, G. O. Sars), 52° N., 15°–16° W., 270–2825 m. (Brady).

Conchoecia striolata, G. O. Sars (Archiv. f. Matematik og Naturvidenskab, XII., p. 256, Pl. xiv., figs. 1–5, 1888).

Agulhas Current.—Port Shepstone, 530 m., 5.iv.01, one single specimen.

G. D.—Mediterranean (G. O. S.).

Conchoecia subarcuata, Claus.

Agulhas Current.—Cape Natal, N. by E., 24 miles, 780 m., 4.iv.01, *rr.*, W. by N., 6½ miles, 97 m., 14.xii.00, *rr.*; Port Shepstone, 530 m., 5.iv.01, *rr.*

G. D.—Madeira, 500–1500 m. (Claus).

Conchoecilla daphnoides, Claus.

West Coast.—Table Mountain, N. 79° E., 40 miles, 450 m., 18.iv.00, *rr.*

Agulhas Current.—Cape Natal, N. by E., 24 miles, 780 m., 4.iv.01, *rr.*

G. D.—34°-38° N., 14°-16° W., 1000 to 1500 m. (Claus), 40 miles off "Achill Head," Ireland, 350 m. (Brady and Norman); 61° N., 5° W., 500–600 m. (T. Scott, International Co-operation); Fiji (Brady).

Conchoecilla lacerta, Brady and Norman (Trans. R. Dublin Soc. (2) V., pt. 12, p. 697, Pl. lxii., figs. 1–4, lxv., figs. 1–10, 1896).

Agulhas Current.—Cape Natal, N. by E., 24 miles, 780 m., 4.iv.01, *rr.*; off Port Shepstone, 530–900 m., 5.iv.01, *rr.*

G. D.—Atlantic: 52° N., 15°–16° W., 918 to 2968 m. (Brady), 60°–61° N. 7°–8° W., 350 and 1043 m. (Brady and Norman).

Conchoecissa cucullata, Brady (Trans. Zool. Soc., Lond., XVI., Pt. 4, p. 191, Pl. xxiv., figs. 1–8, 1902).

Agulhas Current.—Off Port Shepstone, 530–900 m., 5.IV.01, *rr.*

G. D.—52° N., 16° W., 900–2825 m. (Brady).

Conchoecissa imbricata (Brady, *Halocypris. i.* Bdy., Rep. Challenger Ostrac., p. 167, Pl. xli., figs. 1–10, xlii., figs. 1–8. *Conchoecissa i.* G. W. Müller, Jahrbücher Zool., V. Syst., p. 277, 1890. *C. armata*, Claus, 1891, Brady and Norm. Trans. R. Dublin Soc. (2), V., p. 699, Pl. lxiv., figs. 1–5, 1896).

West Coast.—Table Mountain, N. 79° E., 40 miles, 450 m., 18.iv.00, *rr.*

Agulhas Current.—Cape Natal, 780 m., 4.iv.01, *rr.*; off Port Shepstone, 530–900 m., 5.iv.01, *rr.*

G. D.—2° S., 101° W. (G. W. Müller), 32° –34° N., 16°–17° W., 500–1000 m. (Claus), 52° N., 12°–16° W., 900–3078 m. (Brady), 60° N., 8° W., 350 m. (Brady and Norm.).

Euconchoecia chierchiæ, G. W. Müller (Jahrbücher Zool. V. Syst., p. 277, Pl. xxviii., figs. 1–10, 1890—Brady, Trans. Zool. Soc., Lond., XVI., Pt. 4, p. 190, Pl. xxiv., figs. 9–15, 1902. *Halocypris aculeata*, T. Scott, Trans. Lin. Soc., Lond. (2) VI., Zool., p. 142, Pl. xv., figs. 5, 6, 33, 34, 38, 1894).

Agulhas Current.—Off Port Shepstone, 530 m., 5.iv.01, *rr.*

G. D.—S.E. of New Guinea, surface (A. Scott); Arabian Sea, Gulf of Aden, Red Sea, surface (C : e); Gulf of Guinea, 0° S. 7° E., surface (T. Scott), 19° S., 39° W. (G. W. Müller), "Cruz Bay" (Brady).

Halocypris pelagica, Claus.

Agulhas Current.—Off Port Shepstone, 900 m., 5.iv.01, *r.*

G. D.—35° N. 144° E. and 36° N. 158° E. (Brady); Canaries, 34°–38°N., 14°–16°W.; Cape Finisterre, surface and 1000 to 1500 m. (Claus).

Microconchoecia clausii (G. O. Sars, *Halocypris c.*, Archiv. f. Matematik og. Naturv., XII., p. 259, Pl. xi., figs. 7–10, xiv., figs. 6–28, 1888. *Conchoecia c.*, G. W. Muller—*M.c.* Claus).

Agulhas Current.—Off Port Shepstone, 530–990 m., 5.iv.01, *r.*

G. D.—Fiji (Brady), Gulf of Aden, surface (C:e), Canaries, Madeira, and Mediterranean (Claus, G. O Sars, and others), 40° N., 16° W., and 42° N. 42° W.; surface (G. Andersson), 52° N. 15°–16° W., 664 to 2965 m. (Brady).

Paraconchoecia oblonga, Claus.

Agulhas Bank.—Off Buffels Bay, 53 m., 26.iv.00, one specimen.

Agulhas Current.—Off Port Shepstone, 530 m., 5.iv.01, *rr.*

G. D.—Malay Archipelago, surface (G. Andersson), Gulf of Aden, surface (C : e), 34°–38° N. 16°–14° W., surface and 1000 m. (Claus), 42° N. 42° W., and 38° N. 74° W.; surface (G. Andersson), 52° N. 12° W., 823 to 1150 m.; Fiji and 47° S. 46° E. (Brady).

The total number of described species of Halocypridæ amounts to 44, from which number 13 are to be subtracted, as they have been described in a manner too incomplete for identification. The examination of the South African specimens has yielded the number of 14, thus nearly the half of all known forms. All these South African forms have, with one exception, been found in the Northern Hemisphere, or in the eastern temperate Atlantic between the Canaries and the Färöe-Shetland ridge, the Mediterranean included, so that the percentage attains the high figure 93. Of the South African forms

5 have been found in the Indian Ocean.
3 „ „ „ „ „ South Equatorial Current of the Atlantic.
9 „ „ „ „ „ Pacific.
1 „ „ „ „ „ Brazil Current.

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OF

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BY

P. T. CLEVE.

IV. CYPRIDINÆ.

Crossophorus africanus, Stebbing (Rep. of the Government Biologist for the year 1902, p. 189, 1893).—Off Cape St. Blaize, N. by E., 72 miles, 222 metres (Stebbing). This species was not met with in any of the samples examined by me.

Cypridina capensis, n. sp.

Diagn.—Shell about $\frac{3}{5}$ as long as high, without particular sculpture. Its posterior part somewhat compressed and prominent. *Sp* of the 1st pair of antenna with filiform sensorial appendages. *Ri* of the 2nd pair of antennæ 3-jointed, the 1st and 3rd joint of equal length and half as long as the 2nd joint.

Length, 2,7 to 2,8 millim.; breadth, 1,4 to 1,5 millim; height, 1,4 to 1,5 millim.

REMARKS.—This species is very closely akin to *C. mediterranea*, Costa, from which it differs principally in the interior branch of the second pair of antennæ.

Occurrence.—Agulhas Bank, off Cape Infanta, 74 miles, 13.vii.00, several specimens. West Coast, off Lion's Head, 250 miles, 16.iv.00, sparingly. Off Table Mountain, 450 miles, 18.iv.00, several specimens.

Cypridina caudata, n. sp.

Diagn.—Shell about $\frac{8}{5}$ as long as broad; its posterior part protracted, trapezi-form, by an interior chitinous bar separate from the anterior part. Structure: In the anterior and posterior parts there are a number of delicate transverse lines giving the shell a scaly appearance. *Sp* of the 5th joint of the anterior antennae with filiform sensorial appendages. *Ri* of the 2nd pair of antennae rudimentary.

Length, 2,3 millim; breadth, 1 millim.; height, 1,4 millim.

Remarks.—This species is nearly akin to *C. squamosa*, G. W. Müller (Faun. u. Fl. Golfes Neapel, XXI., p. 207, Pt. II., f. 3, etc., 1894), but differs in the form of the shell and in the apparently more delicate structure. Another *Cypridina*, also named *C. squamosa* by Brady (Trans. Zool Soc., Lond., XIV., p. 90, Pl. XVI., figs. 10–12, 1897) seems also to be nearly allied, but there are no anatomical details published, except some claws of the furcal lamina. The *C. squamosa* of Brady has also the posterior part of the shell protracted, but the form is different and the sculpture seems to be much coarser.

Occurrence.—West Coast, off Lion's Head, 277 metres, 19.iv.00, some few specimens.

Cypridina nobilis, n. sp.

Diagn. (*Male* only).—Shell nearly $2\frac{1}{2}$ times longer than high, its dorsal and ventral margins almost parallel; its posterior part protracted and by an interior chitinous bar separate from the anterior part. Structure as in the preceding species, but more delicate and visible chiefly in the posterior part. The 2nd joint of the 1st pair of antennae with small stiff hairs on the exterior and interior margins; the 5th joint with a thick *Sp* that carries on each side about five flat, leaf-like sensorial appendages. *Ri* of the 2nd pair of antennæ rudimentary.

Length, 5,3 millim.; breadth, 2 millim.; height, 2,2 millim.

Occurrence.—West Coast, off Table Mountain, 450 metres, 18.iv.00, some few specimens, all males.

Pyrocypris chierchiæ, G. W. Müller (Jahrbücher Zool. Systematik V., p. 232, Pl. XXV., fig. 1, etc., 1890)—Brady (Trans. Zool. Soc., London, XVI., Pt. 4, p. 186, 1902).

Occurrence.—Agulhas Current, Port St. John, 20–30 metres 8.iv.01, some few specimens.

Geog. Distr.—Bay of Bengal (Brady), Arabian Sea and the Red Sea (Cleve), 13° N. 55° E. (G. W. Müller).

Remarks.—This species seems not to differ from *Eupathistoma natans*, Brady (Trans. Zool. Soc., Lond., XIV., p. 437, Pl. XLIV. fig. 21–26, 1898), the genus *Eupathistoma*, Brady (1898), being founded on the luxuriant development of the superior lip or on the same character as *Pyrocypris*, G. W. Müller (1890).

Description of the three new Species of Cypridina.—The three new species of Cypridina are closely allied and nearly akin to *C. mediterranea*, of which elaborate descriptions have been published by G. O. Sars (Archiv for Matematik og Naturvidenskab, XII., p. 208, Pl. II., figs. 3–4, etc., 1888) and G. W. Müller (Faun. u. Fl. Golfes Neapel, XXI., Pl. II., figs. 19, etc., 1894). It seems, therefore, advantageous to treat of all species together and in comparison with *C. mediterranea*.

Secondary sexual differences do not occur except in the 1st pair of antennæ.

Shell.—The shell of the three species are membranaceous and semitransparent, but there occurred also some ones with slightly calcareous and brittle shells. The form of *C. capensis* (Pl. VII., fig. 1) resembles that of *C. mediterranea* (by Sars), but its posterior part is somewhat more protracted. The posterior part is in *C. caudata* (Pl. VII., fig. 2) and *C. nobilis* (Pl. VII., fig. 3) strongly protracted and limited by an interior chitinous bar, which is denticulate on its posterior margin. The anterior part has, as in most cypridinæ, a sinus, dividing it in a beak and a lower convex margin. The beak and the anterior margin are surrounded, as in *C. mediterranea*, by a hyaline rim, which becomes broader on the inferior margin of the sinus and is there very delicately transversely striate. The rim continues along the ventral margin. On the inside of the beak there are, in all species, two, towards the apex of the beak converging rows of bristles, which also occur along the anterior margin. These bristles are composed of one long and one shorter, closely connected hair.

The *C. capensis* has no particular sculpture, but *C. caudata* and *C. nobilis* have on the outside of the shell numerous small lines or markings, giving it a scaly appearance (Pl. VII., fig. 2 a). These markings are very delicate and distinctly seen in the anterior and, especially, the posterior parts.

The *anterior antennæ* (Pl. VII., fig. 4) agree in all species with those of *C. mediterranea* (Müller, figs. 19, 20); the 2nd joint of *C. nobilis* carries on the anterior and posterior margin small stiff hairs, but is in the other species naked. The 5th joint carries in

both sexes a strong *Sp*, with numerous long sensorial appendages. These are in *C. capensis* and *C. caudata* filiform tubes, as in *C. mediterranea*, but in *C. nobilis* they are flat and leaf-like, about five on each side of the stem. The 6th joint is in *C. nobilis* longer than the 5th, of equal length in *C. capensis*, and bears distally a very small *Se*. The 7th and 8th joints are short and not distinctly separate. The terminal (7–8) joints carry one small *Sa*, one *Sp*, one *Si*, two strong and long *St* and two long sensorial filaments. The *Si* and *Sp* carry in the male, at their bases, a peculiar sensorial apparatus (Pl. VII., fig. 5), a stylet with a cup or funnel-shaped organ. They give off, besides, long branches closely following the trunk of the seta. Some of these branches carry, in the male, small suctorial (?) appendages (fig. 6). The two *St* are strong and give also off branches. The proximal branches of the antennula of *C. nobilis* are cylindrical, sensorial appendages.

The *posterior antennæ* of all species resemble those of *C. mediterranea*, as far as concerns the *B* and the *Re* (Müller, fig. 22). The *Ri* of *C. caudata* and *C. nobilis* (Pl. VII., fig. 8) agree with the *Ri* of *C. mediterranea* (Müller, fig. 21), but in *C. capensis* (Pl. VII., fig. 7) this part is prolonged and 3-jointed, the joint between *Ri* 2 and 3 sometimes being indistinct.

The *mandibles* of all species agree completely with the same organ in *C. mediterranea* (Müller, fig. 14). The terminal joint carries in *C. nobilis* (Pl. VIII., fig. 10) one *Se*, three strong claws and two *Si*, one as long as the claws, one half as long. In *C. capensis* (Pl. VIII., fig. 9) I found only two claws, but two *Se*, and besides the two *Si* still a very faint one.

The *maxilla* of the three species resemble in general the same organ in *C. mediterranea* (Müller, figs. 23, 24). *B* 1 carries one hairy *Se*. I failed to discover a *Se* in *B* 2. On the limit between *B* 2 and the stout *Ri* there is a chitinous bar, that carries the "lamelliform appendage," probably representing *Re*. This lamelliform appendage has the same form in all the three species and in *C. mediterranea*. The three lamelliform basal lobes carry strong flat and hairy setæ, the first lobe 10, the two following 5 each. The exterior margin of the *Ri* carries in *C. nobilis* small short hairs, and in the distal part of the interior margin some hyaline denticulations. The setæ are crowded in the distal part (Pl. VIII., fig. 11). There is proximally a group of three setæ, which probably represent *Si* of *Ri* 1, and on the opposite margin 2 *Se*. The intermediate part carries four different sets of setæ. The three exterior are different in different species (see figs. 12, 13). In *C. capensis* the exterior is remarkable for its coarse pinnulation. The 3 *St* are also

different in different species. The 3 *Si* are strong claw-like. Besides these nine setæ there is a group of four *Sp*, of different length in different species, long and slender in *C. caudata* and *C. nobilis*, short in *C. capensis*.

The *second maxilla* or *first maxilliped* has in all species the same shape as in *C. mediterranea* (Müller, fig. 9). The two proximal lobes (Pl. IX., fig. 15) carry transverse rows of five short setæ of unequal length, all bearing stiff bristles. The 3rd lobe is somewhat dissimilar (Pl. IX., fig. 16) and carries six setæ of different kind. The 4th lobe (Pl. IX., fig. 17) carries six short but stout and strong claws with coarsely denticulate edge, decreasing in size outwards. At the base of the lobe there is one hairy *Se* and two stronger *Si*. The 5th lobe (Pl. IX., fig. 18) carries three sets of setæ, proximally a row of four long, slender ones, distally also four, shorter and stouter in *C. caudata* and *C. nobilis*, but as long as the other in *C. capensis* (Pl. IX., fig. 21). Between both rows there is still a row of four setæ, resembling the proximal. There is, besides, at the base, a hairy *Si*. Between the 5th lobe and the vibratory plate (=Re ?) there is a group of three lobes (Ri ?, see Müller's Monograph). The distal of these three lobes (fig. 22) bears 1 + 2 setæ, the median and largest in *C. caudata* and *C. nobilis* 1 + 2 + 2 and, besides, a small hairy apiculus; in *C. capensis* there are only three setæ, the proximal carries two setæ. At the base of the median lobe there is a hairy seta.

The "*first leg*" (probably the *second maxilliped*) is in all species of essentially the same form as in *C. mediterranea* (Müller, fig. 13). I found in the basalis of *C. capensis* and *C. nobilis* a group of six small *Se*. The terminal lobe carries in *C. nobilis* twelve, in *C. capensis* and *C. caudata* nine bristle-bearing setæ, the three distal being in the two latter species by a gap separate from the six proximal.

The *vermiform legs* of all species resemble those of *C. mediterranea*.

The *furca* of all species do not differ from the same limb in *C. mediterranea* in other respects than the number of claws. I found in all species nine claws, regularly decreasing in size from the distal one.

[Published 27th March, 1905.]

EXPLANATION OF PLATES.

Plate VII.

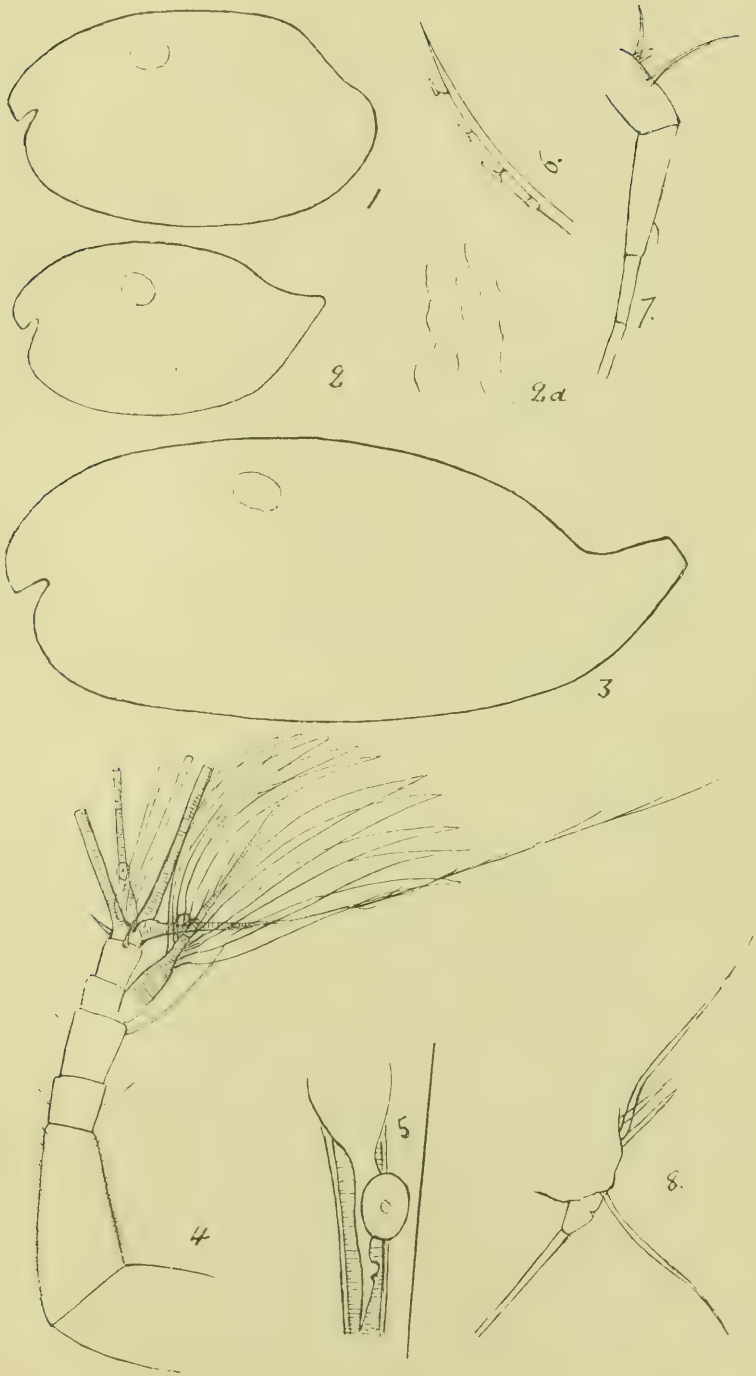
Fig. 1. Cypridina capensis, Cleve, ♀ (× 17).
,, 2. Cypridina caudata, Cleve, ♀ (× 17).
,, 2A. Structure of the Shell (× 300).
,, 3. Cypridina nobilis, Cleve ♂ (× 17).
,, 4. Cypridina nobilis, antenna of the 1st pair ♂ (× 40).
,, 5. Basal part of the *Sp* of 4 (× 300).
,, 6. "Suctorial organs" on the branches of *Sp* in the *C. capensis* ♂ (× 500).
,, 7. *Ri* of an antenna of the 2nd pair, *Cypridina capensis* ♀ (× 170).
,, 8. *Ri* of an antenna of the 2nd pair, *Cypridina nobilis* ♂ (× 170).

Plate VIII.

, 9. End of the mandible, *Cypridina capensis* ♀ (× 170).
,, 10. End of the mandible, *Cypridina nobilis* ♂ (× 170).
,, 11. End of the maxilla, *Cypridina nobilis* ♂ (× 170).
,, 12. One of the *Se*, *Ri* 2–3 of the maxilla, *Cypridina capensis* (× 500).
,, 13. One of the *St*, *Ri* 2–3 of the maxilla, *Cypridina capensis* ♂ (× 500).

Plate IX.

,, 14. One of the *Se*, *Ri* 2–3 of the maxilla, *Cypridina caudata* ♀ (× 500).
, 15, 16, 17, 18. *L*1, *L*3, *L*4, *L*5 of the 1st *maxilliped*, *Cypridina nobilis* ♂ (× 170).
,, 19, 20. Setæ of the *L*5 of the 1st maxilliped, *Cypridina caudata* ♀ (× 300).
,, 21. Setæ of the *L*5 of the 1st maxilliped, *Cypridina capensis* ♂ (× 500).
,, 22. *Ri* (?) of the 1st maxilliped, *Cypridina nobilis* ♂ (× 170).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ON THE

ECHINODERMA

FOUND OFF THE COAST OF SOUTH AFRICA.,

PART IV. CRINOIDEA.

BY

PROFESSOR F. JEFFREY BELL, M.A.

(Plates II.—IV).

The proportion of new species in this section of my report is not only very large as compared with the preceding sections, but is also large absolutely. As I took occasion to remark some twenty years ago, it is to the Crinoids with their stalked larvae that we must look to filling up lacunae in the details of the geographical distribution of Echinoderms. Proportionately to other Echinoderms, Crinoids are doubtless much richer in specific forms. The few species in the collection are represented by numerous specimens, with the pleasing result of elastic diagnoses.

Antedon capensis (Pl. II.)

This species appears to be allied to Carpenter's *A. basicurva* (see Chall. Report Comat., p. 102), but to differ from it and *A. incisa* by the larger number of cirrus-joints.

The centro-dorsal is flat, bare in the centre, with two rows of very stout cirri, as much or more than 25 mm. long. Arms very stout, but so broken that their length cannot often be guessed, somewhat flattened from side to side; an almost complete arm is figured; arm joints overlap, and are often provided with a median tooth, so that the arm, when viewed from the side, appears to have a dorsal keel; the pinnules, which are stout and stiff, taper rather abruptly. The arms are beautifully spotted with purple.

Most of this description will apply to a number of specimens, but there are very striking differences among them, some are very stout and strong, others are almost delicate; as the specimens have been in formalin and in spirit, too much importance is not to be ascribed to the absence of pigment, or to the difference to be seen in its distribution on the bodies of different examples.

The specimens were procured as follows :—

Locality.	How procured.	Depth in fathoms.	Nature of bottom.	Reference No.
Off Algoa Bay, close to Riy Bank, Long. 25° 51′ 30″ E. Lat. 33-58 S.	By dredge	25	Dark sand, black specks and rocks	508 B
Tugela River Mouth, N.W. by W., 3½ miles.	By dredge	14	Rocks	11386
Rocky Bank, False Bay.	By dredge	17-27	Rocks	15610
Rocky Bank, False Bay.	By dredge	17	Rock and coral	15597 and 8
Durnford Pt, N.E. by E., 9 mi.	By dredge	13	Sand and shell	11801

Antedon sclateri (Pl. III.)

This somewhat variable species appears to belong to Division II. of Carpenter's *A. savignyi* group (see Chall. Report Comat., p. 252). There are not as many as 20 joints in the cirri, and may be no more than 15, the distichal pinnule is small, and there are no lateral processes to the pinnules; there are 20 arms or less, but always more than 10.

The cirri vary not only in the number of joints, but in the length of them, so that what appear to be fully developed cirri may be less than 15 or more than 30 mm. long; the increase in length is due rather to the increased length of the joints than to an increase in number.

The specimens were procured as follows :—

Locality.	How procured.	Depth in fathoms.	Nature of bottom.	Reference No.
East London, N.W. ½ N., 18 miles.	By shrimp trawl	250-300	Broken shells	12676
East London, N.W. ½ N., 18 miles.	By shrimp trawl	250-300	Broken shells hard ground)	12711

Antedon magnicirra (Pl. IV.)

This species appears to stand next to *A. angustiradia* of Carpenter's classification (see Chall. Report Comat., p. 252), for there are three distichals not succeeded by palmars, and the cirri are of great length, but not in as many as ten vertical rows, nor is the distichal pinnule longer than the rest.

The centro-dorsal is high, with three or four vertical rows of sockets ; the cirri may be as much as 70 mm. long, and the joints 60–80 in number ; the most proximal one very short, the next much longer, their successors broad and flattened from side to side, the distal 40 are keeled. The proximal arm joints are fairly rectangular, the rest are narrower, alternately, on one side than the other ; no pinnules are very long, but they are all stout.

Length of arm about 100 mm. Colour, cream yellow.

The specimens were procured as follows :—

Locality.	How procured.	Depth in fathoms.	Nature of bottom.	Reference No.
East London, Buffalo River, N.W. ½ W., 19 miles.	By shrimp trawl	300	Sand	12725
East London, N.W. ½ N. (approx.), 20 miles.	By shrimp trawl	400–450	Sand and stones	12792
East London, Buffalo River, North, 15 miles.	By shrimp trawl	310	Coral and mud	12885 & 6

Actinometra parvicirra.

Alecto parvicirra, J. Müller, Abh. Ak. Berl., 1841, p. 185 ; *Actinometra parvicirra*, P. H. Carpenter, Trans. Linn. Soc. ii. (1879), p. 27 ; id., Chall. Rep. Comat. (1888), p. 338.

This variable species, with many names, which was the only Crinoid dredged by the "Challenger" in Simon's Bay, was taken in 17 fathoms in False Bay. Younger examples of the genus, which may belong to this species were dredged as follows :—(1) Off Algoa Bay, close to Riy Bank, Long. 25° 51′ 30″ E., Lat. 33° 58′ S.; depth, 25 fms. Bottom, dark sand, black specks and rocks. Refer. No. 508A.

(2) Tugela River Mouth, N.W. by W., 3½ miles ; depth, 14 fms. Bottom, rocks. Refer. No. 11385.

[PUBLISHED 28TH AUGUST, 1905.]

DESCRIPTION OF PLATES II–IV.

These figures have been carefully drawn by Mr. Berjeau from individuals, and give, therefore, no idea of the variations of the species.

Plate II.

Fig. 1.—*Antedon capensis:* to show the general habit, the form of the arm and arm joints, the characters of the cirri, and the distribution of the syzygies, × 2.

Fig. 2.—An arm from the side, showing the dorsal ridge and the shape of the pinnules, × 8.

Fig. 3.—A single cirrus, × 8.

Plate III.

Fig. 1.—*Antedon sclateri:* to show the general habit, and the variations in the arm joints and syzygies, and other characters as in Plate II., Fig. 1, × 2.

Fig. 2.—The proximal end of one arm seen from the side, showing the characters of the pinnules, × 4.

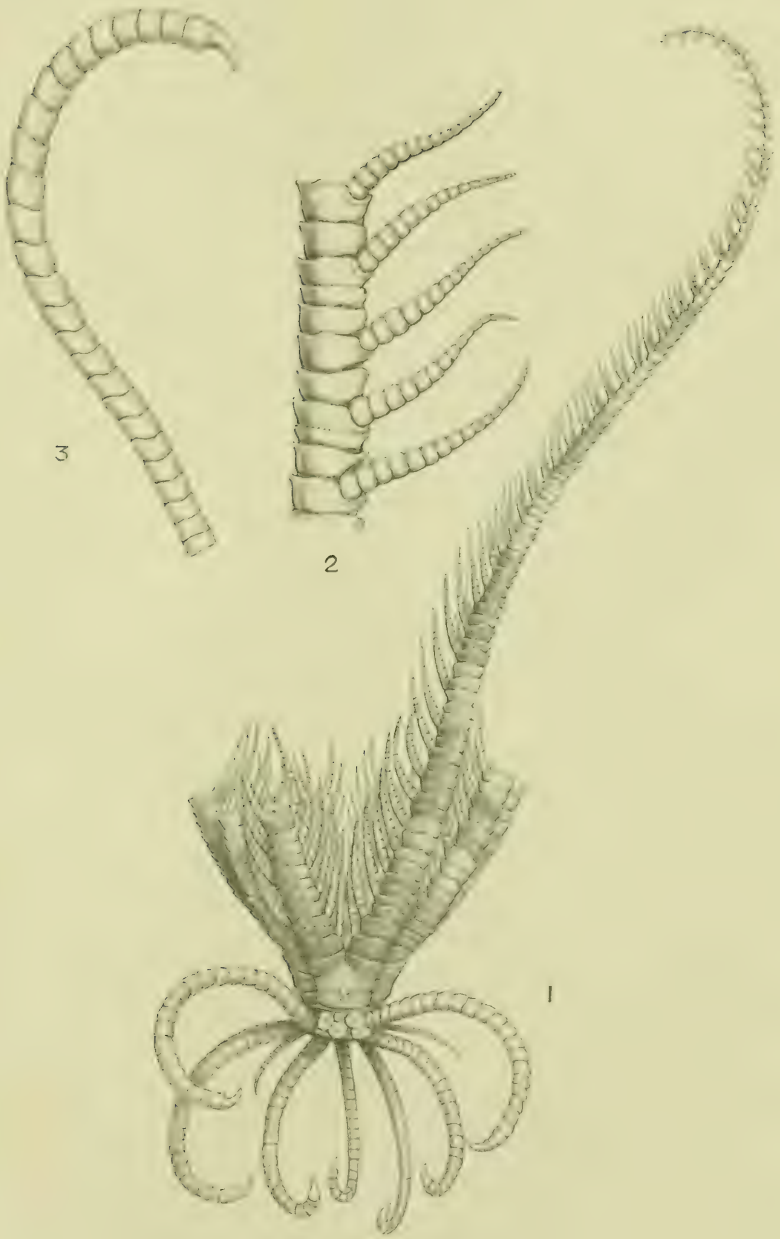
Fig. 3.—A single cirrus, × 4.

Plate IV.

Fig. 1.—*Antedon magnicirrus:* to show the general habit, the form of the arm and the arm joints, the characters of the cirri and the distribution of the syzygies, × 2.

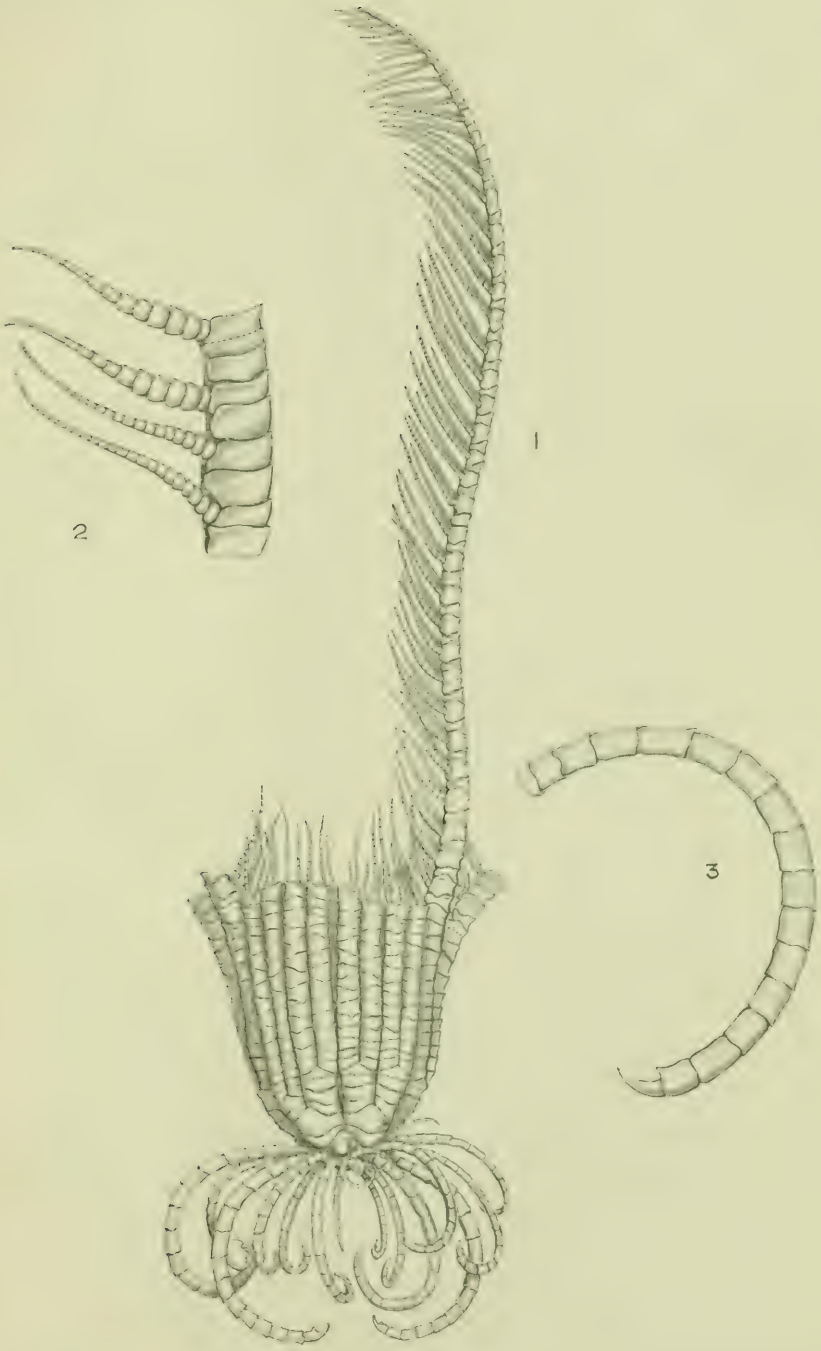
Fig. 2.—An arm from the side showing the form of the arm plates and pinnules, as well as the remarkable subsidiary plates between the arm joints, × 4.

Fig. 3.—One of the cirri, × 4.



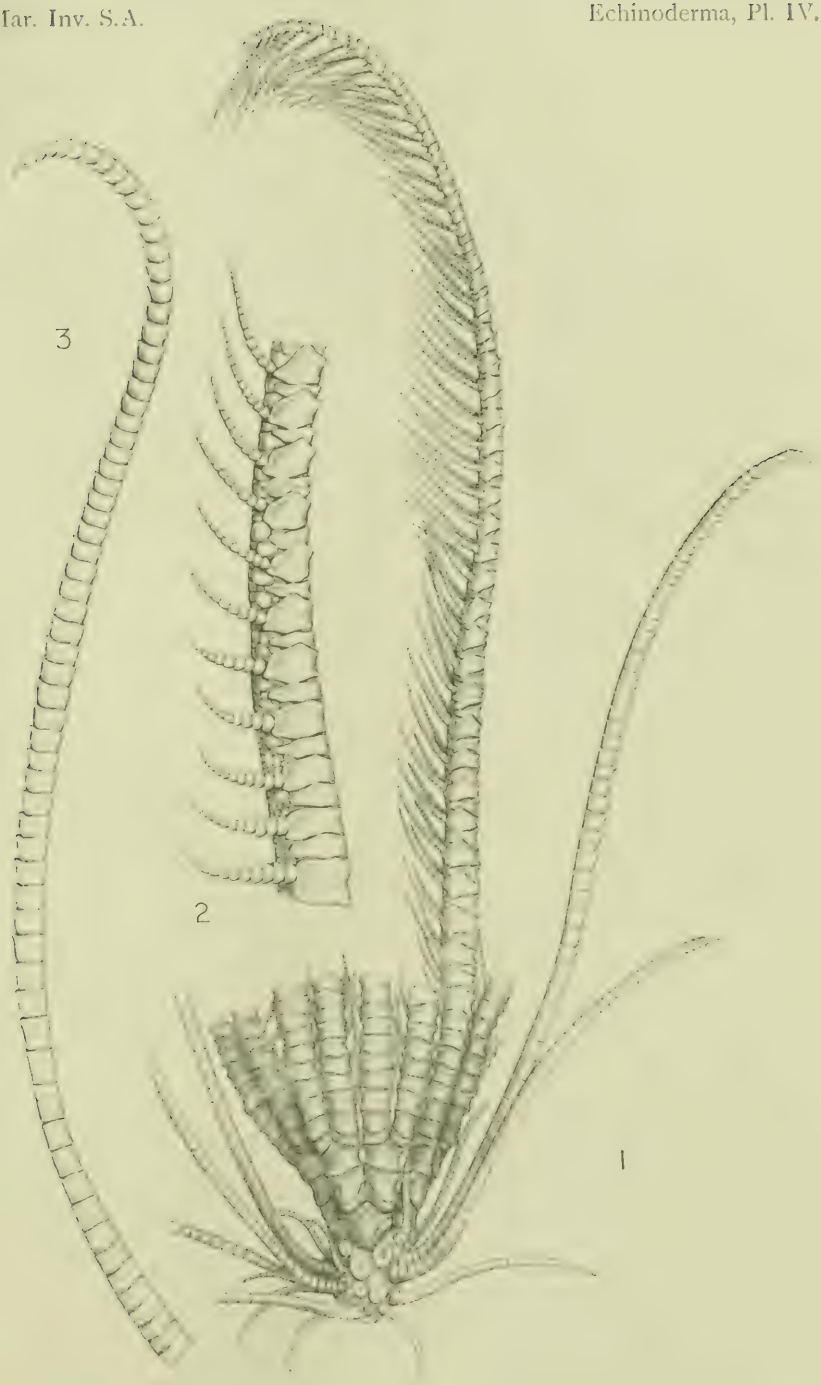
C. Berjeau. Butterworth.

ANTEDON CAPENSIS.



C. Berjeau. Butterworth.

ANTEDON SCLATERI.



C. Berjeau. Butterworth.

ANTEDON MAGNICRINUS.

DESCRIPTION OF FIFTEEN NEW SOUTH AFRICAN FISHES, WITH NOTES ON OTHER SPECIES.

BY

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The following report on fishes procured during the course of the investigations of the "*Pieter Faure*" and in collections from shallower waters contains descriptions of three new genera and six new species from comparatively deep water, together with five new species and one new variety from shallow water.

As regards the deep water forms, there are added to the family of the Zeidae ("John Dories") two new genera and a new species of a genus already described from Cape waters, viz., Cyttosoma (Mar. Inv., Vol. III., p. 6) which may be, as explained below, the adult of Cuvier and Valenciennes' Oreosoma. A third new genus, of the family Stomiatidæ, is also described (Neostomias). These were all found within a few miles of Cape Point. Five new species, mostly from the same locality, are also described (Cottunculus spinosus, Læmonema globiceps, Bathypterois filiferus, B. ater and Halosaurus niger).

Notes on other deep sea forms are given (Antimora viola, Barathronus bicolor, Catætyx messieri, Porogadus miles, Chlorophthalmus gracilis, Scopelus coccoi, Ipnops murrayi, Halosaurus affinis, Cyttosoma boops).

Of the shallow water forms, new species are recorded in the family of the Scorpænidæ (2), Mugilidæ (1), Ophidiidæ (1), Pleuronectidæ (3), Clupeidæ (1); while notes are added on other shallow water species, viz., Monocentris japonicus, Zeus japonicus, Synaptura cornuta, Hatophrys grandisquama, which have recently been found and may now be added to the South African Marine Fauna.

The examination of a special collection of fish made in connection with the important practical question of the destruction of immature forms by certain methods of fishing has thrown some light on this subject. The following is a list of these fish :—(1) Atherina breviceps (adult), (2) Spratelloides æstuarius, n. sp. (adult), (3) Clupea sagax (young), (4) Engraulis holodon (young), (5) Chrysophrys holubi (young and adult), (6) Sciæna aquila (young), (7) Pagellus lithognathus (young), (8) Mugil algoensis, n. sp. (adult).

The first four were popularly regarded as young forms of one species; of these the only young forms were 3 and 4, a young herring and a young anchovy respectively, the adults of which will be found in the deeper waters and may yet prove of commercial value. No. 5 is known as the "White Stumpnose" and thought to be the young of the ordinary White Stumpnose (Chrysophrys globiceps). It proves, however, to be a different species (C. holubi), of a much smaller size. Nos. 6 and 7 are undoubtedly young and immature forms of sea-fish. No. 8 is not, as is supposed, the immature form of the ordinary "harder" but belongs to a different and smaller species.

In Part I., Vol. I., of the "Marine Investigations" a list of the known species of the flat fishes of Cape Colony was given. These were then six in number. With the addition of one species recorded from Natal and another (Synaptura punctatissima, Peters) recorded by Steindachner from "Algsa Bay" (probably a misprint for Algoa Bay, at Port Elizabeth) the total number of known South African Flat Fishes was eight. The addition of another 20 species necessitates the enlargement of this key (*vide* p. 163).

The following is a classified list of all the species here dealt with. New species and genera are indicated by darker type :—

	Order.	Family.	Page.
1. Polyprion americanum	Acanthopterygii	Serranidae	.. 145
2. Tetraroge **monacanthus**	,,	Scorpaenidae	.. 145
3. ,, **gymnoderma**	,,	,,	.. 147
4. Monocentris japonicus	,,	Berycidae	.. 148
5. Cottunculus **spinosus**	,,	Cottidae	.. 149
6. ,, **macrocephalus**	,,	,,	.. 149
7. Cyttosoma boops	,,	Zeidae	.. 150
8. ,, **verrucosum**	,,	,,	.. 151
9. **Pseudocyttus maculatus**	,,	,,	.. 153
10. Neocyttus **rhomboidalis**	,,	,,	.. 153
11. Zeus japonicus	,,	,,	.. 154
12. ,, capensis	,,	,,	.. 154
13. Laemonema **globiceps**	Anacanthini	Gadidae	.. 157
14. Barathronus bicolor	,,	Ophidiidae	.. 158
15. Cataetyx messieri	,,	,,	.. 159
16. Porogadus miles	,,		.. [illegible]

	Order.	Family.	Page.
17. Ammodytes siculus	Anacanthini	Ammodytidae	.. 159
18. Solea **cleverleyi**	,,	Pleuronectidae	.. 160
19. Synaptura **regani**	,,	,,	.. 161
20. ,, cornuta, juv.	,,	,,	.. 161
21. Platophrys grandisquama	,,	,,	.. 161
22. Cynoglossus **acaudatus**	,,	,,	.. 162
23. Plagusia marmorata, var **africana**	,,	,,	.. 163
24. Chlorophthalmus gracilis	Physostomi	Scopelidae	.. 165
25. Scopelus coccoi	,,	,,	.. 165
26. Ipnops murrayi	,,	,,	.. 166
27. Bathypterois **filiferus**	,,	,,	.. 166
28. ,, **ater**	,,	,,	.. 167
29. **Neostomias filiferum**	,,	Stomiatidae	.. 168
30. Halosaurus **niger**	,,	Halosauridae	.. 170
31. ,, affinis	,,	,,	.. 171
32. ,, sp.	,,	,,	.. 171

Fam. SERRANIDAE.

Polyprion americanum.

This fish is not uncommon in Cape waters and is known to fishermen as the "Bafaro." Only one has been procured by the trawl, and it showed an interesting anomaly in having six distinct branchial rays in the ventral fin, the spine having apparently been converted into a branched ray. It was procured during trawling operations at Mossel Bay, 4th July, 1902, from a depth of 30–35 fathoms.

Fam. SCORPAENIDAE.

Tetraroge monacanthus, n. sp.

(Plate XXXVII.)

The fishes which are here described under this name and which fall under the genus Tetraroge as defined by Günther (Cat. II., p. 132) would almost necessitate a new genus if the further sub-division of this genus, suggested by Day, were accepted. It is one of the forms which connect the Cape Fauna with that of the Indian Ocean and East Indies, and may be, as Mr. Regan, who has examined the specimen, suggests, *T. dermacanthus* of Bleeker, whose specimen was from Ceram. In as much, however, as it differs from the description of this species in having only one anal spine (not particularly small) and has barbels though not well developed it is here described as a new species.

Br. 6. D. XIII 10. A. I 8, V. I 5.

Length of head $2\frac{3}{4}$, pectoral $3\frac{1}{2}$, caudal $4\frac{1}{2}$, height of body 3 times in length of body. Eye rather small, 5 times in length of head, equals interorbital space and $1\frac{1}{2}$ in its distance from end of snout.

Two bony ridges run along the snout and over the interobital region to meet the dorsal fin. The superciliary ridges are about equally prominent so that the interobital space is crossed by four longitudinal ridges. Two bony ridges run backwards from the orbit nearly to under the 4th spine, one a continuation of the superciliary ridge and the other parallel to it but at a lower level. The preorbital is provided with two blunt spines, the second of which is larger than the first, and is about equal to the diameter of the eye. The preoperculum is provided with four blunt spines, the first and lowest being very small and the posterior being about equal to the larger of the two preorbital spines. There are no prominent spines on the operculum. There is under each jaw a small inconspicuous dermal appendage.

There are villiform teeth on jaws and vomer but not on palatines.

The dorsal fin commences over the centre of the eye. It consists of 13 spines, the first three of which are longer than the succeeding, and are placed nearer to each other than to those succeeding. Of the ten soft rays the largest is a little more than the greatest length of the first three spines and all are longer than the other spines. The pectoral reaches to the anus, the ventral about half way.

The scales are peculiar and have a resemblance to the placoid type. On the surface they appear as papillæ which are rough to the touch. If a piece of skin be examined microscopically from below a number of circular scales with the usual lines of growth are seen; these are fairly large, being greater in diameter than the spaces between them. On each of these is a relatively strong spine whose point is turned backwards. The number of tube-like elements of the lateral line is about 10.

The colour in formalin is dark brown speckled with blacker spots on body and fins. There is a dark band on the tail.

Five specimens were got in all, two (the largest and type 47 mm. in total length) from the coast of Natal (False Bluff, N.E. $4\frac{3}{4}$ miles). They were procured by shrimp trawl, depth

20 fathoms, bottom fine sand. Two were also procured from off Umhlanga River Mouth, 2½ miles, by shrimp trawl, depth 22–26 fathoms, bottom fine sand.

Tetraroge gymnoderma, n. sp.

(Plate XXXVII.)

A second species of Tetraroge is readily distinguished from the preceding by its entire absence of scales.

D. XV 5-6. A. III 4. VI 3. Ll. 8.

Head 2¾ in body, equals length of pectoral which is slightly longer than caudal; depth of body little over 3 times in its length.

Diameter of eye nearly 4 times in head, equals the interorbital space and also its distance from the snout.

Bony ridges on snout and interorbital space not marked. Preorbital has a sharp spine with a smaller one at its base; preopercular with 4 spines the last of which is the longest. Two blunt spines on upper part of operculum. No dermal appendage to lower jaw.

Villiform teeth on jaws and vomer, none on palatine.

The dorsal fin commences over the posterior margin of the eye. The first spine is less than half the length of the second and third which are the longest and are not separated from the succeeding by a larger space than that between each other. The last spine is longer than those immediately in front and nearly equals the length of the succeeding rays. The pectoral reaches to the 2nd spine of the anal and the ventral to the anus.

No scales could be discerned in a piece of skin examined microscopically. There are 8 tubes of the lateral line.

The colour in spirit is a dark brown over the head and anterior part of body, a brown band over the body at the beginning of the anal and one across the root of the tail. In most specimens these become, however, bleached out. The following colour notes were taken at time of capture: "Brownish brick red in large patches, chiefly behind head and under anterior part of dorsal, in the middle of the body and on the caudal region; in some specimens the colour appears in dots in these regions. All the fins are speckled with brown dots."

Numerous specimens of this species were found. They were procured as follows :—

Locality.	Date.	How Procured.	Depth. fathoms	Ref. No.
Cape St. Blaize, N. by E., dist. 8½ miles.	22nd Oct, 1900.	Large dredge.	39	10,474
Great Fish Point Light-House, W. ½ W., dist. 2½ miles.	30th Aug., 1901	Shrimp trawl.	30	13,636
Bird Island Lighthouse, N. ½ W., dist. 8½ miles.	5th Oct., 1901.	,,	57–59	14,038
False Island, N. by W. ¼ W., dist. 7 miles.	21st Sept., 1901.	,,	49	13,894
Rockland Point, N.W.¼ N., dist. 2½ miles.	8th June, 1900.	Large dredge.	23	5,064
Seal Island, S. by W. ½ W., dist. 2 miles.	25th Nov., 1902.	Dredge.	9	16,100
Bakoven Rock, N.W. by W., dist. 2 miles.	11th Nov., 1902.	,,	24	15,881
Swart Klip, N.E., dist. 1 mile.	24th Aug., 1903.	,,	9	17,482
Fish Hoek Bay.. ..	24th Dec., 1902.	Shrimp trawl.	5	16,378

Fam. BERYCIDAE.

Monocentris japonicus.

Three specimens of this fish have been found in South African waters within the last few years in the course of the work of the "*Pieter Faure*," as follows :—

Locality.	Date.	How Procured.	Depth. fathoms	Ref. No.
Mossel Bay	24th June, 1898.	Shrimp trawl.	20	88
Mossel Bay	6th Feb., 1903.	Large trawl.	30–36	16,446
Fish Point Lighthouse, N.W. by W., dist. 4½ miles.	17th April, 1903.	,,	35	18,700

There can be little doubt that these specimens are specifically identical with the species found in Japanese waters. Mr. Boulenger, to whom one was sent, was of this opinion, and I have carefully compared all the specimens with some from Japan, which Mr. Kishinouye was good enough to forward for this purpose.

Fam. COTTIDAE.

Cottunculus spinosus, n. sp.

(Plate XXXVIII.)

D. IV 10. A. 10. V. 3. P. 16.

Length of head equals its breadth and is $2\frac{2}{3}$ in length of body without caudal, which is about a fourth of the length of the body and equal its depth ; diameter of eye equals the length of the snout and is $2\frac{1}{2}$ in the depth of the body. Length of largest 45 mm.

There are small teeth in the upper and lower jaw arranged in rows of three anteriorly, but in one row posteriorly. There are no teeth in the vomer.

The head has a series of spines or sharp tubercles arranged with perfect bilateral symmetry with reference to the body. The two most prominent and largest are situated over the occipital region and are about $\frac{2}{3}$ the diameter of the eye in length. There are a series of five running downwards and forwards from each of these on each side of the head to a single one situated between the eyes. There are also two (one very small) situated between these two largest ones and the opercular opening ; also a group of four similar, but smaller on the anterior margin of the precperculum—one on the snout and on the preorbitals.

The dorsal commences over the pectoral. The spines, which seem to be four in number, are covered by the loose skin, the tips only showing externally as dark spots. The anal falls in the same vertical as the dorsal. The ventrals reach the vent, the distance of which from the snout is $2\frac{1}{4}$ in the length of the body.

Locality : A single specimen was procured, Cape Point bearing N. 70° E., distant 40 miles ; depth, about 800 fathoms.

Cottunculus macrocephalus, Gilchr.

(Plate XXXIX.)

Subsequently to the finding of specimens of a Cottunculus described (Marine Investigations, Vol. III., p. 7) as a new species (*C. macrocephalus*) additional specimens were procured of a much larger size (the largest being 290 mm. as against

45 mm. of the type) and differed from the first procured in certain respects which may quite well be due to their being adult or older form of the above-named species. The head and eye are relatively smaller in the large forms, while the fin formula is apparently different, being D. VII 18. A. 13. P. 21. V. I 3.

In these fishes, however, the fin formula can only be accurately ascertained by dissection and in the case of small forms it is difficult to ensure that some of the spines or rays are not overlooked.

In the larger forms villiform teeth are apparent in the jaws, but none on the vomer or palatine.

The distance of the ventrals from the snout is nearer $\frac{1}{4}$ than $\frac{1}{3}$ of the length of the body.

Locality.	Date.	How Procured.	Depth. fathoms	Ref. No.
Cape Point, N.E. $\frac{3}{4}$ N., dist. 39 miles.	17th Sept., 1903.	Shrimp trawl.	310–560	17,992
,, ,, ,,	,,	,,	,,	17,992A.
Cape Point, N. 41° E., dist. 38 miles.	16th Sept., 1903.	,,	315–400	17,944

Fam. CYTTIDAE.

Cyttosoma boops, Gilchr.

A smaller specimen than the type, obtained Cape Point Lighthouse bearing N.E. $\frac{3}{4}$ E., distant 29 miles, by shrimp trawl on the 11th June, 1903, depth 470 fathoms, undoubtedly belongs to the above-named species and throws some interesting light on the identification of the adult form. In describing this species (Mar. In. Vol. III., p.7) the presence of one or two large scales was noted without particular importance being attached to them. Only one was distinctly seen and is represented in the figure (*vide* Plate XXIII., Vol. III.)

In this smaller form there are distinctly two below the anterior part of the dorsal fin and, in addition, others of a similar character along the side and below the abdominal region, and there are arranged in a manner closely approximating to that shown in Cuvier and Valencienne's figure of Oreosoma atlanticum.

This comparison is suggested by Mr. Boulenger's note (C.R. Ac. Sci., Paris, 1903) on the following species which was found about the same time and place, and which he suggests may belong to the genus Oreosoma. In all probability Cyttosoma boops, C. verrucosum (see below) and Oreosoma atlanticum should be included in the same genus, the last being an immature form of the first. To keep the question open, however, till confirmatory specimens are procured, I still include the forms found by the Cape Government steamer under the genus Cyttosoma with the following amended definitions: Body compressed, elevate, enlarged scales or tubercles on the sides and the ventral region of the body. First dorsal much shorter than second, anal with 3 spines and many rays which are similar to those of the dorsal. Ventrals are well separated and consist of a strong spine and 6 or 7 soft rays. Branchiostegals 7.

Cyttosoma verrucosum, n. sp.

(Plate XL.)

Oreosoma sp. Blgr., C.R. Ac. Sci. (Paris), 1903.

? Oreosoma, C. and V., IV, p. 515, pl. 99.

Br. VII. D. VI 31. A. III 29. V. 16. Ll. 95.

Body rhomboidal, greatest depth $1\frac{1}{2}$ in length. Head large, $\frac{2}{5}$ of length of body. Eye $2\frac{1}{5}$ in head or $3\frac{1}{2}$ in height of body. Caudal peduncle slender; its depth equals the interorbital space, which is about $2\frac{1}{2}$ in diameter of eye. Premaxillary protrusible and can be received into a horse shoe shaped fontanelle which extends backwards to between centre of eyes. The maxillary extends to the anterior fourth of the eye. Gills $3\frac{1}{2}$, no opening behind last. Gill rakers longer than lamellæ, 20 on the lower limb of first arch. Pseudobranchiæ well developed.

Unlike its nearest generic relation Cyttus, this fish is covered with scales which though small are stout and well developed, having a blunt conical elevation in their centre which renders the body rough to the touch. They are somewhat similar to the rough tubercular scales on certain regions of the body of *C. boops*. The most marked feature, however, are two rows of enlarged scales roughly parallel to each other on the side of the body, one immediately below the pectoral fin and another immediately above the ventral. Great variations occur in

the number, size and shape of these scales in different specimens, but they always are disposed more or less in two rows. In one specimen they were specially clearly marked (*vide* plate XL.), about 12 being above and 11 below. No trace whatever was found of any enlargement of scales in the region below the 1st dorsal as in C. boops. Two or three rows of enlarged scales, smaller however than the preceding, occur on the ventral aspect between the ventrals and anal. The scales along the base of the dorsal and anal are pectinate and slightly larger than those of body. The lateral line has a sharp curve in its anterior portion, its highest point falling just in front of the first dorsal spine; its posterior portion forms a slight curve becoming straight in the tail region.

The spines of the dorsal are short and stout. The first is very small, the second being the longest. They are continuous with the long second dorsal, the rays of which gradually increase in size from about the length of the 6th spine in front to about 5 times this length behind. The spines of the anal are stout like those of the dorsal, the first, however, here being the longest; they are continuous with a long, soft portion which is very similar to the soft portion of the dorsal. The rays in both fins are simple. The pectoral fin is short, rounded, and composed of 20 simple rays. The ventrals are well separated (*vide* plate XL.) and composed of one strong spine and six soft branched rays.

The caudal is short, somewhat rounded, and composed mostly of branched rays, those at the side unbranched and sometimes one or two unbranched between the branched rays.

Many specimens of this fish were found about 30 miles off Cape Point in about 600 fathoms.

Pseudocyttus, n.g.

Body compressed, elevate rhomboidal, upper profile straight. Eyes moderate in size. Scales small deciduous cycloid replaced by tubercles on dorsal and ventral regions as in Cyttosoma, but there are no enlarged scales on the sides of body as in that genus. The first dorsal has six spines and the anal has two. The ventrals have one spine and five rays, and are well separated. There are a few feeble teeth on the jaws, but the palate is toothless. Branchiostegals 6, gills $3\frac{1}{2}$, no opening behind the last. Pseudobranchiæ well developed. This new genus, like the succeeding, is closely related to Cyttosoma.

Pseudocyttus maculatus, n.sp.

(Plate XLI.)

Br. VI. D. VI 34. V. 15. P. 20. Ll. 100 (circa).

Upper jaw moderately protractile. Distance between tip of snout and eye being $\frac{2}{3}$ diameter of eye, which is contained $7\frac{1}{2}$ times in the length (185 mm.) and $4\frac{1}{2}$ times in depth of body. Length of head three times in length of body. Interorbital space $1\frac{1}{5}$ in diameter of eye. The maxillary extends to below the front margin of the eye.

Colour : Grey with large dark spots.

Only one specimen found off Cape Point (N. 41° E., 38 miles) by shrimp trawl, at a depth of 315–400 fathoms, 16th September, 1903. (Reference number, 17,938.)

Neocyttus, n.g.

Body compressed and elevate. Eyes large. Scales small ctenoid and not deciduous. The first dorsal has seven spines, the second of which is stronger and longer than the others. There are three anal spines, the first of which is thick and long like the second dorsal. Ventrals I 6, close together. Teeth on jaws and vomer. Branchiostegals 7.

Neocyttus rhomboidalis, n.sp.

(Plate XLII.)

Br. VII. D. VII, 33-35. A. III 30-33. V. I 6. Ll. 104 ?

Upper jaw moderately protractile. The distance of the snout from the eye when mouth is closed is a little less than half the diameter of the eye. The greatest depth of the body is about $3\frac{1}{2}$ times the diameter of the eye and is contained $1\frac{1}{2}$ times in the length of the body (140 mm.). Length of head is $2\frac{1}{2}$ times in the length of body. Interorbital space $1\frac{1}{4}$ in diameter of eye. The mouth is not so protractile as that of Cyttosoma, the superior limb of the pre-maxillary being $1\frac{1}{4}$ in the interocular width and much shorter than the maxillary.

The scales of the body are small but stout and are all ctenoid. They are all about the same size. Near the base of the dorsal and anal they are slightly smaller, but a single row of larger scales occurs immediately at the base about the same size as

those of the middle region of the body, with free edges not running into the minute ctenoid scales, which cover the rays of the dorsal and anal to over half their length. Scales similar to the last mentioned occur also in the rays of the pectoral.

On the head region there are a series of bony ridges, viz., on the operculum where they assume a fan shape, and along the border of the preoperculum. The interoperculum has also a few striæ, as have also the maxillary, mandibular, preorbital and supraorbital.

This description is from the largest specimen (170 mm., including caudal). The smaller specimen (about $\frac{2}{3}$ of this length), besides having larger eyes, showed a marked difference in the greater length of the large spines of the dorsal, anal and ventral. In the larger these were respectively 24, 19 and 26 mm., being 22, 18 and 24 in a specimen 126 mm.

Two were procured in the same haul as Pseudocyttus maculatus. (Reference numbers, 17,947, 17,939.)

Zeus japonicus, C.V.

Three specimens of this fish have recently been found in South African waters. The largest (300 mm.) was procured by large trawl from the East Coast (Nanquas Peak, N.E. by N. $\frac{1}{4}$ N., $6\frac{1}{2}$ miles), from a depth of 47 fathoms, bottom mud.

One, 170 mm. in length, from Simonstown, forwarded by a fisherman, and one only an inch in length, procured off the Tugela River (N. by W. $\frac{1}{4}$ W., $15\frac{1}{2}$ miles) by shrimp trawl, from a depth of 40 fathoms, January 1st, 1901. (Reference No. 11,307.)

There can be little doubt as to the identification of these specimens as they were found to agree with the description and figure of Zeus japonicus, and Mr. Boulenger, who has been good enough to compare a specimen, finds it shows complete agreement with Japanese specimens of Z. japonicus.

Zeus capensis, C.V.

The list of the members of the family of the Zeidæ of the Cape seas may be completed by a note on the single species previously recorded from South Africa (Zeus Capensis, C. and V., x p. 23). This species is described as differing from the European Z. faber only in (1) having the number of plates at the base of the soft dorsal smaller and more numerous (eleven), and (2) especially in their spines being

not forked but single, small and inclined backwards : further (3), the series of plates between the ventral and anal are not provided with points. Zeus Capensis is also described as having one ray less in the soft anal.

Smit (Scandinavian Fishes, p. 308) refers also to the difference between Zeus faber and Zeus capensis as "extremely slight," and adds : "The latter may perhaps deserve a distinct specific name as the form marked by an increase in the number of spinous plates." The following table drawn up on an examination of eleven specimens of Z. capensis varying from adults to quite small forms will show more clearly to what extent the two species differ :—

	Total length in Milli-meters.	Number of plates at base of—				Spines single (S) or double (D).	Spines and rays of Dorsal.	Spines and rays of Anal.	Black spots and lat. line.	Ventral plates with or without points.
		Dorsal.		Anal.						
		right.	left.	right.	left.					
A	427	11	11	10	10	S	x 24	iv 20	above.	without.
B	400	11	11	10	10	S	x 24	iv 20	,,	,,
C	400	11	12	11	11	S	x 23	iv 21	,,	,, or very faint.
D	398	11	12	11	11	S	x 23	iv 21	,,	without.
E	235	10	10	10	9[1]	S	x 23	iii 21	,,	with.
F	212	11	11	11	11	D[2]	x 23	iv 21	on.	,,
G	125	11	10	11	11	D[3]	ix 24	iv 21	above.	,,
H	115	10	11	11	10	D[4]	x 23	iii 21	,,	,,
I	115	11	11	11	11	D	x 23	iv 21	,,	,,
J	115	11	10	11	11	D	ix 24	iv 21	,,	,,
K	87	9	11	9	9	D	x 23	iv 21	,,	,,
Z. faber		7–10		7–9		D	x 22	iv 21	below.	with.

(1) One broken included.
(2) Only rudiment of accessory spine slightly marked on dorsal plates, distinct on anal plates of left side.
(3) Rudiment only of accessory spine forming a ledge on dorsal and anal plates of both sides.
(4) Very distinct accessory spine.
Localities : A, D, E, Simon's Bay ; B, C, False Bay ; F—K, Buffels Bay.

From an examination of this table it will be seen that, on the whole, there is in *Z. capensis* a larger number of spinous plates at the base of both the soft dorsal and anal ; the forked spines, said to be characteristic of Z. faber, are found only in the smaller forms, indistinctly in some but very distinct in the smallest. The difference between the South African and European species, said to be indicated by the presence or

absence of points on the ventral plates, is also not constant as will be seen from the last column, where it is again to be noted that the smallest form approaches nearest to the condition of *Z. faber*.

One difference is found to be constant in all the species examined, namely, the position of the black spot on the side. In *Z. faber* it is in the middle of the body, about half way up the side and nearly equidistant from the posterior edge of the operculum and the lateral line, while in *Z. capensis* it is about $\frac{3}{4}$ up the side and just above or on the lateral line.

On the whole the difference between the two species seem to be sufficiently well-marked to separate them as distinct varieties at least and the closer resemblance of the young forms of *Z. capensis* to the adult of *Z. faber* seems to indicate that the latter is the older form phylogenetically. This resemblance is in the presence of points on the ventral plates and forked or double spines on those at the base of the dorsal and anal. An examination of a considerable number (40) of small specimens, varying in total length from 18 to 50 mm., showed that this feature is constant in the young forms, the spines being as well developed in these as in the adults of *Z. faber*. They were procured as follows :—

Reference No.	Locality.	No.	Size, including caudal, in mm.
15,390A.	Cape Point Lighthouse, N.E. by E., 6¾ miles ..	1	17
10,315	Walker Point, E. by S., 5 miles	15	26–36
10,417	Gericke Point, N. 57° E., 8 miles	10	36–49
8,040	Cape Infanta, N.E. by N., 19 miles	1	43
2,880	Vondeling Island, N. ¼ W., 9 miles	1	22
242A.	23 miles S.W. from Cape St. Blaize	2	28–38
10,423	Gericke Point, N.E. ¾ E., 13½ miles	10	23–50

In all of these small specimens the large black spot was as in the adult, viz., on or above lateral line though in a few there were, in addition, less conspicuous spots elsewhere, usually alongside it, sometimes in the centre of the body, as in *Z. faber*.

Fam. GADIDAE.

Læmonema globiceps, n.sp.

(Plate XLIII.)

Body compressed, tapering from head region with a straight dorsal and ventral edge to the somewhat slender tail. Its height is contained five times in its length. The head is globular, slightly broader than deep, and is contained a little over $4\frac{3}{5}$ times in the length of body; the mucous cavities of the head and thin transparent skin give it a swollen appearance. The eye is about $3\frac{1}{2}$ times in the head and $1\frac{1}{2}$ times in the interorbital space, which is flat and wider than in any other species. The maxillary reaches to the posterior third of the eye. There is no barbel. Teeth villiform, in a narrow band (1 row in lower, 2 to 3 in upper) in both jaws; none on vomer or palatines.

The first dorsal commences over the base of the pectoral, and consists of five rays, the first of which is very long ($3\frac{3}{5}$ in length of body). The second dorsal, of about 70 rays, commences at a distance behind the first about equal to the length of the base of the latter. The anal of 66 rays commences under the 6th ray of the 2nd dorsal. Anal and dorsal end near the caudal, the free part of which is about double its depth.

Ventrals apparently consist of "a single long ray bifid at its end" (*vide* generic definition), the inner and longer branch reaching to the 3rd or 4th ray of the anal, the shorter to the anus. If dissected out, however, and examined more minutely, it is found that there are three rays, one very short on the inner side, the second long, and the third about half its length.

The scales are moderately small, feeble and deciduous. There are five between the first dorsal and the lateral line and 16 (?) between this and the ventral aspect. The lateral line consists of about 20 pierced scales separated from each other by a distance about equal to half the diameter of the eye. The lateral line has a marked curve till it reaches the middle of the body from whence it continues backwards in a straight line. The number of rows of scales between the head and base of the caudal is about 90.

I have placed this fish under the genus Læmonema provisionally. It differs from the description of the type of that genus in the ventrals which, though apparently "reduced to a single long ray, bifid at its end," really consists of three rays.

Specimens of this fish were procured by shrimp trawl at the following localities :—

Locality.	Date.	Number Procured.	Depth. fathoms.	Ref. No.
Cape Point, N. 49° E., dist. 38 miles.	Sept. 11th, 1903.	1	475–550	17,864
Cape Point, E. ¾ N., dist. 38 miles.	July 29th, 1903.	1	630	17,172
Cape Point, N.E. by E. ¼ E., dist. 38½ miles. (2 specimens procured one of which is a female 180 mm. in length and with well-developed ova.)	June 23rd, 1903.	2	755	16,711
Cape Point, E. ½ N., dist. 34½ miles.	Aug. 20th, 1903.	5	500–550	17,399 A—C.
Cape Point, N. 81° E., dist. 32½ miles.	Sept. 9th, 1903.	2	460–630	17,688
Cape Point, N. 81° E., dist. 32 miles.	Aug. 28th, 1903.	1	460	17,619
Cape Point, E. ½ N., dist. 34½ miles.	Aug. 20th, 1903.	1	500–550	17,392
Cape Point, E.N.E., dist. 36½ miles.	Sept. 10th, 1903.	2	660	17,791
Cape Point, E. by N., dist. 35 miles.	Sept. 9th, 1903.	2	500	17,738
Cape Point, E. ½ N., dist. 36 miles.	Aug. 28th, 1903.	3	700–800	17,653
Cape Point, E. by N. ¾ N., dist. 34 miles.	Sept. 10th, 1903.	8	480–600	17,761
Cape Point Lighthouse, N.E. ¾ E., dist. 36 miles.	June 11th, 1903.	1	600	16,657

Barathronus bicolor, Goode and Bean.

A specimen of this fish was procured by shrimp trawl off Cape Point (E.N.E., 36½ miles), from a depth of 660 fathoms. Reference No. 17,090. It corresponds closely to the above-named species, the type of which was procured off Guadaloupe from a depth of 769 fathoms.

It is slightly over 120 mm. in length, which was the length of the type, and is a female with well-developed ova, each about 1·2 mm. in diameter. The general colour is white with a few small dark patches on the body and dark streaks as in the type. The eye is not visible through the skin. The vomer has three teeth on each side, the two outer of which are longer than the inner.

Cataetyx messieri, Günth.

Three young specimens (about 40 mm. long) of this large deep sea viviparous Gadoid were procured by dredge off Umhlangakulu River (N.W. by N. 7½ miles) from a depth of 50 fathoms. Reference No. 12,368.

The adult male and female I have already mentioned, and described the eggs and young (Marine Investigations, Vol. III., pp. 141-143).

The young were characterised by a much inflated abdominal region, which ventrally was infolded to form a sort of groove in which the ventrals lay.

Porogadus miles, Goode and Bean.

One specimen procured by shrimp trawl off Cape Point (E ½ N., 36 miles), from a depth of 700–800 fathoms (Reference No. 17,652), seems to be the above species. The pectoral described as imperfect in the type is complete in this specimen, and is nearly one half the length of the head (1.7 in head); the ventral, which consists of two filaments, free from each other, is scarcely the height of the body, being equal to the distance between the lateral line and the ventral side of the body. Distance of origin of ventral to vent slightly greater than length of head.

Total length, 255 mm.

The type (153 mm. in length) is from Albatross Station, 2230, North latitude 38° 27′, West longitude 73° 02′, at a depth of 1,168 fathoms.

Fam. AMMODYTIDAE.

Ammodytes siculus, Günth. (?)

Three specimens of this fish have been procured, one found in the trawl of the Government vessel in False Bay, 27th September, 1903; one procured by fishermen, Kalk Bay, and one, which was greatly damaged, from the stomach of a "snoek" (Thrysites atum), caught in False Bay, 27th July, 1904. Mr. Boulenger informs me that there is a similar specimen in the British Museum from the coast of Kaffraria, received from Mr. Weale and identified by Dr. Gunther as A. siculus.

There are 52 rays in the dorsal, the pectorals are rather long, being a little longer than lower jaw and over 46 per cent. of length of head, and the mandible is slightly less than the length of the body. It appears to agree with A. siculus, and may be regarded as such provisionally.

Fam. PLEURONECTIDAE.

Solea cleverleyi, n.sp.

(Plate XLIV.)

D. 82. A. 68. L. l. 120.

Depth of body 3.4, length of head nearly 5 times in length (without caudal). Longitudinal diameter of eye nearly 6 times in length of head, upper slightly in advance of lower, interorbital space less than half diameter of eye. Snout truncate, slightly in advance of lower jaw. Mouth extends to below centre of lower eye. Lips not fringed, though there are numerous short tentacles on the blind side of head. Two nostrils close together in front of the lower eye, the anterior tubular. Margins of opercula slightly fringed.

Dorsal commences over anterior third of upper eye and extends to root of caudal fin. Dorsal and anal rays unbranched. The right pectoral, which is covered with scales to nearly one-half of its length, 1.8 in head; left pectoral slightly less than right.

Scales ctenoid on both sides.

The lateral line contains 120 pierced scales.

Colour (in spirit): Grey on right side, distal half of pectoral almost black; left side, including pectoral, colourless.

Locality: Sent by Mr. Cleverley, Resident Magistrate at Walfish Bay, along with several other specimens of fish, including a Synaptura microlepis. The species is named after its discoverer.

Readily distinguished from all other South African species of Solea by narrow body and shape of snout.

Synaptura regani, n.sp.

(Plate XLV.)

Depth of body $2\frac{1}{2}$–$2\frac{2}{3}$ times in the total length, length of head $5\frac{1}{2}$ times. Eyes contiguous, the upper in advance of the lower, their diameter $4\frac{1}{2}$–5 times in the length of the head. Mouth extending to below anterior part of eye; nasal tube simple, opercular membrane fringed. D. 68–70; A. 56–59; C. 17; the posterior of dorsal and anal connected to the basal half of

the caudal, which is quite distinct and rounded. The width of the base of the caudal fin equal to half the length of the head. Right pectoral about equal in length to diameter of eye ; left pectoral half as long. Sc. 82–88 $\frac{25}{31-34}\frac{27}{}$, ciliated, extending on to each ray of dorsal and anal in a double series, which become a single series in the outer half of the fin. On the ocular side, greyish, with 13 pairs of dark brown cross bands, extending to the margins of the dorsal and anal fins ; the anterior band of the first pair on the snout, the posterior passing through the front of the eyes ; the anterior band of the first pair passing through the base of the pectoral ; the last band on the base of the caudal fin. Caudal blackish in its posterior half, with oblong white spots.

Total length, 140 mm.

Three specimens, procured $2\frac{1}{2}$ miles from the mouth of the Umhlanga River ; depth, 22–26 fathoms ; bottom, fine sand ; in coloration very similar to S. ommatura, Richards, from the seas of China and Japan, a species which has more numerous fin-rays and much smaller scales.

The species is named after Mr. Regan, B.A., who has described allied forms and has kindly given the benefit of his judgment on the validity of this new species.

Synaptura cornuta, juv.?

A small flat fish closely resembling S. cornuta was procured by shrimp trawl off Amatikulu Conical Hill (N.W., $7\frac{1}{2}$ miles), at a depth of 26 fathoms ; Reference No. 11,636. It resembles so closely this species that it is provisionally designated as above.

Platophrys grandisquama, Schleg.

A few small flat fish were found in the trawl off the East Coast (Amatikulu River Mouth, bearing N. W. by W. $\frac{3}{4}$ W., distant 12 miles). Depth, 26-27 fathoms, bottom mud. They agree closely with the Rhombus grandisquama of Schlegel (Faun. Jap. Poiss p. 183, pl. 92, fig. 3 & 4) and recorded from Chinese and Japanese Seas and the N. W. Coast of America. They were of a dark brown colour with a few darker patches at the bases of the dorsal and anal fin and two at the base of the caudal.

The largest was 70 and the smallest 50 mm. (including caudal). Ref. No. 11731.

Cynoglossus acaudatus, n.sp.

(Plate XLVI.)

D. 102. A. 85. V. (left) 4. L. l. 65–63.

Depth of body 3, head a little less than 5 times in length of body, height of head greater than its length. Diameter of eye 7 times in head, upper slightly in advance of lower. They are contiguous, there being no interorbital space. The posterior margin of the lower slightly in front of the middle of the length of the head. Snout hooked; a tubular nostril in front of lower eye.

The dorsal begins about half way between the end of the snout and the vertical from anterior margin of upper eye. In the specimens procured the caudal rays were absent, and the space in which they would normally appear was occupied by a transparent membrane connecting the projecting rays of the dorsal and anal.

Scales: ctenoid on both sides. Two lateral lines on the left side separated by 10 rows of scales. The upper ends abruptly near the end of the second third of the length of the body. No lateral line could be detected on the blind side.

Colour: Uniform brown. Examined with a lens, each scale is found to have a thin central horizontal line of dark colour, and many spots of a similar colour along the free margin.

Near C. interruptus (Yokohama).

Locality:

Reference No.	Locality.	Procured. By.	Procured. No.	Depth, fathoms
11,769	Amatikulu River Mouth, N.W. by by W. ¾ W., 12 miles.	Shrimp trawl.	9	26–27
17,765	Cape Point, E. by N. ¾ N., 34 miles	,,	2	480–600
11,511B.	From mouth of large fish. Durban			

Plagusia marmorata, var. *africana*.

(Plate XLVII.)

D. 104. A. 81. V. 4. L. l. 110.

Depth of body 3.6, length of head, $4\frac{1}{3}$ in total length (without caudal). Eye small, diameter equals interorbital width, upper in advance of lower, slightly in advance of middle of head. Angle of mouth below hind edge of lower eye and nearer edge of operculum than snout. A tubular nostril in front of lower eye and a corresponding one on the blind side. The snout is rounded and blunt, not pointed.

The single ventral is joined by a membrane to the anal.

Scales, ctenoid on both sides.

Two lateral lines on left side separated by 17 rows of scales. No lateral line on right side, though there are 3 or 4 pierced scales in front and behind nostril on the right side of the head.

This fish closely resembles *Plagusia marmorata*, Blk. but differs in having a few more scales in the lateral line, a much blunter snout, but chiefly in the absence of a lateral line on the right side.

Locality : A single specimen from Natal.

KEY TO SOUTH AFRICAN PLEURONECTIDAE.

A. *Jaws and dentition nearly equally developed on both sides.*

a. Eyes on left side, teeth small, scales deciduous .. .. .. **Arnoglossus**
1. D. 72, A. 50, Ll. 47 .. (1) ,, **macrolepis.**
2. D. 81, A. 72, Ll. 60 .. (2) ,, **capensis.**

b. Eyes on left side close together, teeth unequal in size .. .. **Pseudorhombus**
1. Lower jaw with 5 teeth (3) ,, **russelli.**
2. ,, ,, ,, 8-12 ,, (4) ,, **andersoni.**
3. ,, ,, ,, 20 ,, (5) ,, **natalensis.**

c. Eyes on left side widely separated **Platophrys**
1. D. 76-83, A. 58-62, Ll. 40 (6) ,, **grandisquama.**
2. D. 87, A. 72, Ll. 50 .. (7) ,, **dimorphus.**

d. Eyes on right side .. .. (8) **Paralichthodes algoensis.**

B. *Cleft of mouth narrow, dentition most developed on the blind or uncoloured side.*

a. Eyes on the right side, caudal free — Solea
1. Interorbital space less than ½ eye .. .. (9) .. cleverleyi.
2. Interorbital space equal to ½ eye, Ll. 113-115 .. (10) .. capensis.
3. Interorbital space equal to ½ eye, Ll. 94 .. .. (11) .. turbynei.
4. Interorbital space nearly equal to eye .. .. (12) .. bleekeri.
5. Interorbital space more than eye .. .. (13) .. fulvo-marginata.

b. Eyes on right side, caudal free, pectorals rudimentary .. (14) Achirus capensis.

c. Eyes on right side, caudal joined to dorsal and anal .. .. — Synaptura
1. Right pectoral longer than head .. .. .. (15) .. pectoralis.
2. Right pectoral ½ to ⅔ head (16) .. microlepis.
3. Right pectoral not ½ head, 13 pairs transverse bands (17) .. regani.
4. Right pectoral not ½ head, about 13 transverse bands (18) .. cornuta.
5. Right pectoral not ½ head, fins edged with white .. (19) .. marginata.
6. Right pectoral not ½ head, fins edged with black .. (20) .. melanoptera.
7. Right pectoral not ½ head, spotted .. .. (21) .. punctatissima.
8. Right pectoral not ½ head, scales with filaments .. (22) .. ciliata.

d. Eyes on left side, no pectorals, more than one lateral line, lips not fringed .. .. .. — Cynoglossus
1. Three lateral lines on coloured side .. .. (23) .. capensis.
2. Two lateral lines on each side .. .. (24) .. attenuatus.

No lateral lines on right side :—
3. Height of body 3 times in length .. (25) .. acaudatus.
4. Height of body 4-4½ times in length .. (26) .. brachycephalus.

e. Eyes on left side, no pectorals, more than one lateral line, lips fringed .. .. .. (27) Plagusia marmorata var. africana.

f. Eyes on left side, no pectorals, no lateral line .. .. .. (28) Aphoristia variegata.

Fam. SCOPELIDAE.

Chlorophthalmus gracilis, Gthr.

Specimens of this fish were obatined :—

Reference No.	Locality.	Procured. By.	Procured. No.	Depth. fathoms
16,745	Cape Point, N.E. by E. ¼ E., 38 miles.	Shrimp trawl.	2	755
16,705	Cape Point, N.E. by E. ¼ E., 38½ miles.	,,	1	,,

Those obtained by the *Challenger* were off the eastern coast of New Zealand (1,100 fathoms), middle of South Atlantic (1,375 fathoms), and off Juan Fernandez (1,425 fathoms).

Scopelus coccoi, C.

A large number of this fish was taken (18th August, 1903) by townet, as follows :—

Reference No.	Locality.	Procured. By.	Procured. No.	Depth, fathoms
17,287A.	Cape Point, E. by N., 45 miles ..	Townet.	150	Surface
17,354	Cape Point, E. ¼ N., 43 miles ..	,,	100	,,

When placed in a jar of water they were very lively, but did not exhibit the luminosity which might be expected from the large number of "luminous" organs which they possess ; the only trace of light given out when examined carefully in the dark was an occasional flash of no great intensity when the fish were disturbed by inserting the hand in the jar.

Males and females were present in about equal proportions in the first lot (numbering 150) procured. They were readily distinguished externally by the deeper body of the females and by the fact that the luminous scales were invariably above the caudal part of the body in the males and below it in the

females. This was confirmed by dissecting a large number of specimens, when it was seen that the ovaries were fairly well developed, and it was probably the spawning time.

Ipnops Murrayi, Günth.

One specimen of this interesting fish was procured by shrimp trawl off Cape Point (N.E. by E. ¼ E., 40 miles), from a depth of 800–900 fathoms; Reference No. 16,897. It differs from the description of the type in having anal slightly further forward, the pectorals somewhat longer (extending to middle of ventrals). There is also a small patch of teeth on each of the palatine bones.

Total length, 5½ inches.

The *Challenger* specimens were obtained off the coast of Brazil (1,600 fathoms), near Tristran da Cunha (1,900 fathoms) and north of Celebes (2,150 fathoms).

Bathypterois filiferus, n.sp.

(Plate XLVIII)

Depth of body nearly 6 times in length (223 mm.) without caudal, head 4⅕ times. Interorbital space 2.3 in length of head, wider than length of snout which is 2.6 times.

Teeth in jaws and vomer.

Anus about midway between pectoral and anal, and has a small papilla.

The upper pectoral ray is very long (405 mm.), nearly twice the length of the body, reaching far beyond the tip of the caudal. It is not bifid, but the second ray is closely applied to it so as to make them appear as one. They separate at a point opposite the adipose dorsal fin. The free portion of the second is about half the length of the head and is bifid. The third ray is small, being about 4½ in the depth of the body; the fourth ray is half the size of the third, and is separated from the other rays of the pectoral by a space about equal to its length. Of the 12 remaining rays, the longest reaches to the posterior end of the base of the caudal fin.

The two external rays of the ventral are short and bound together for about ⅔ of their length. They are dilated at their extremities, which reach nearly to the root of the caudal. The dorsal fin commences at the middle of the body, and the anal commences below the end of the dorsal.

The caudal is deeply bifurcate; the two lowest rays are prolonged, and have broadened tips with pads, as in the case of the ventrals.

Scales: Deciduous, cycloid.

Specimens were procured as follows:—

Reference No.	Locality.	Procured. By.	Procured. No.	Depth, fathoms.
17,174	Cape Point, E. ¾ N., 38 miles ..	Shrimp trawl.	1	630
16,934	Cape Point, N.E. by E. ¼ E., 40 miles.	,,	1	800–900
17,294	Cape Point, E. ¾ N., 41 miles ..	,,	1	890
16,659	Cape Point Lighthouse, N.E. ¾ E., 36 miles.	,,	1	600
17,235	Cape Point, E. ¾ N., 40 miles ..	,,	1	810
17,119	Cape Point, N. 70° E., 40 miles ..	American trawl	1	800
17,020	Cape Point, N.E. by E. ¼ E., 46 miles.	Shrimp trawl.	1	900
17,320	Cape Point, N. 86° E., 43 miles ..	,,	1	900–1000
17,019	Cape Point, N.E. by E. ¼ E., 46 miles.	,,	1	900
16,820	Cape Point, N.E. by E. ¾ E., 38½ miles.	American trawl	10	750–800

Bathyptcrois ater, n.sp.

(Plate XLIX.)

Depth of body 6 times in length without caudal (146 mm.), head nearly 5½ times. Interorbital space 2½ times in head; shorter than snout, which is a little over 3 times. Anus about half way between snout and root of caudal.

The upper pectoral ray (217 mm.) is longer than the body and extends beyond the tip of the caudal fin by about a third of its own length. The second is closely applied to the first for the greater part of its length. No rudimentary rays were found in the axil of them; of the other 8 separated rays the fourth is longest and reaches to beyond the insertion of the anal fin.

The two external rays of the ventral are prolonged beyond the third. They are bound together to about the middle of this projecting part. The second is the longest and reaches to nearly the posterior end of the base of the anal. They are slightly detached at the extremities.

The dorsal commences well in front of the middle of the body, and the anal below the end of the dorsal.

There is a well-developed adipose fin, midway between the dorsal and the caudal.

The caudal is deeply bifurcate, the lower rays are slightly shorter than the upper though the tips of the two lower are slightly swollen and not branched like the other caudal rays.

There is a notch on the lower margin of the tail at the base of the caudal fin.

Scale cycloid, not deciduous, and well marked.

Differ from B. filiferus in position of dorsal and much shorter ventrals, being nearest to B. longifilis in this respect, but differing from it in radial formula, scales and possession of a notch.

One specimen procured off Cape Point (N.E. by E. $\frac{1}{2}$ E., 43 miles) by shrimp trawl, from a depth of 900 fathoms. Reference No. 16,983.

Fam. **STOMIATIDAE.**

Neostomias, n.g.

Body elongate, compressed, without scales. Pectorals reduced to a single fine ray. Barbel very long, reaching to the dorsal, and provided with filaments and luminous spots. Vomer toothless. Dorsal about half the length of anal, both situated far back. Nearest Eustomias.

Neostomias filiferum, n.sp.

(Plate L.)

Br. 9. D. 22. A. 40. P. 1. V. 7.

Body long, of a uniform height between pectorals and ventrals, viz., $11\frac{1}{3}$ times in total length (230 mm.) without caudal, length of head 8 times, the front profile of the head is straight and makes a somewhat sharp angle with that of the body, thus making the snout somewhat pointed. The lower jaw does not project beyond the upper. There are 4 branchial arches, with a slit behind the fourth. There are no pseudobranchiæ, though certain slight corrugations of the epidermis in this region may be remains of pseudobranchiæ.

There are 8 or 9 fang-like depressible teeth in the upper and lower jaw, but none in the palate. The barbel is very long (207 mm.), being $1\frac{1}{10}$ in the length of the body. In contradistinction to the intense black of the body it is colourless except that, at intervals, black bodies may be seen through the colourless skin. There are, moreover, a series of minute black dots along the ventral side of the barbel for about $\frac{1}{3}$ of its length, where a number of filaments originate.

There are on the dorsal side 2 long filaments (34 mm.), ending in minute bulbs at the tips; between this there is a thick filament, not so long (10 mm.), also ending in a bulb which has, however, a short hair-like prolongation. About the middle of this median filament there are two much finer filaments, also ending in bulbs. A little behind the origin of these, the main barbel, shows a slight swelling, and this was observed to be luminous. Toward the end of the barbel the dark patches show through the colourless skin as a series of beads. The extremity of the barbel is characterised by a clump of bulbous expansions, observed to be luminous, and a number of filaments with bead-like swellings.

Luminous organs. There were none to be observed in the head region except those at the base of each of the branchiostegals. Two rows commence immediately behind the barbel, running backward between the pectorals and ventrals at intervals about equal to $\frac{2}{3}$ the diameter of the eye, about 67 pairs in all. There are two other rows parallel to these, commencing behind the opercular opening and running along the sides of the body outside the pectorals and ventrals till they reach about the 11th ray of the anal, where they join the ventral series. In addition to this there is a sprinkling of very minute spots over the ventral surface of the body, most marked in the neighbourhood of the larger luminous spots.

The dorsal begins far back, the distance between its commencement and the caudal being $\frac{1}{7}$ of the total length; it ends near the caudal, its total length being about the length of the head. The anal is longer, its centre being nearly under the commencement of the dorsal. The pectorals are reduced (apparently) to single filaments, and are about $1\frac{1}{4}$ in the depth of the body. The ventrals have 7 rays and are slightly longer than pectorals. None of the rays are prolonged, but their tips are filamentous.

One specimen, procured off Cape Point (E.N.E., $36\frac{1}{2}$ miles), from a depth of 660 fathoms. Reference No. 17,791.

Fam. HALOSAURIDAE.

Halosaurus niger, n.sp.

(Plate LI.)

Br. 12. D. 12. V. I 8. L. tr. $\frac{1}{5}$.

The length of the head is greater than its distance from the ventrals, is equal to its distance from the dorsal, and is $6\frac{1}{2}$ times in the length of the body (about 2 feet). Snout produced, a little less than post-ocular part of the head, its pre-oral portion being $\frac{1}{4}$ of its length. The eye is contained a little over 5 times in the snout, and nearly $2\frac{1}{2}$ times in the interocular width. The height of the body equals the distance between the centre of the eye and the pectoral fin or nearly 12 times in the total length. The maxillary reaches to the front margin of the eye.

Scales of the lateral line enlarged, provided with photophores. No scales on the region between the base of the skull and the tip of the snout. The dorsal fin has large scales on the basal part of its rays, and these are present also on the anal but apparently not on the pectoral or ventral.

The dorsal is situated slightly behind the ventral, which is about the same distance behind the tip of the pectoral. Ventrals short, about half the length of the pectorals, broad and close together, their bases under the 10th scale of the lateral line.

Colour : Black.

Specimens were procured as follows :—

Reference No.	Locality.	Procured. By.	Procured. No.	Depth, fathoms
17,293	Cape Point, E. $\frac{3}{4}$ N., 41 miles ..	Shrimp trawl.	1	890
16,893	Cape Point, N.E. by E. $\frac{1}{2}$ E., 40 miles.	,,	1	800–900
16,937	Cape Point, N.E. by E. $\frac{1}{2}$ E., 40 miles.	,,	1	800–900

A small specimen, about 12 cm. in length, was procured :—

17,257	Cape Point, E. $\frac{3}{4}$ N., 42 miles ..	Shrimp trawl.	1	930

This last seems to belong to the same species as the others, but the head is black, the body white, and the snout longer.

Halosaurus affinis, Günth

D. 12. V. 18.

Length of head equals its distance from ventrals, and is 7.3 in total length. Snout produced spatulate nearly equals post ocular part of head, its pre-oral portion being about 2.3 in its length. The eye is contained about 4 times in the snout, and is equal to the interorbital space and about $\frac{1}{5}$ post-ocular portion of head. The maxillary scarcely reaches the eye.

The dorsal is a little behind ventral and consists of 12 rays, the first small, about $\frac{1}{4}$ the length of the second. The rays are unbranched; the succeeding are branched with the exception of the last two. Ventrals $1\frac{1}{2}$ times in pectorals.

Scales of lateral line enlarged, provided with photophores, 15 before the ventrals and 28 in front of anus. There appear to be at least 2 series of scales between the lateral line and the anal fin at its anterior end.

Mr. Regan, who has been kind enough to examine a duplicate of this specimen, is of opinion that it agrees in every way with H. affinis, which is probably not, however, distinct from H. rostratus.

Reference No.	Locality.	Procured. By.	Procured. No.	Depth, fathoms
17,714	Cape Point, E. $\frac{3}{4}$ N., 38 miles ..	Shrimp trawl.	2	630
17,742	Cape Point, E. by N., 35 miles ..	,,	1	500

Halosaurus sp.

A single specimen of this species was procured off Cape Point (N.E. $\frac{1}{4}$ N., 46 miles) by shrimp trawl, from a depth of 760 fathoms. It is apparently different from the two species described above, the ventrals being well in advance of dorsal, and the end of the maxillary falling under the posterior margin of the eye. Owing to the condition of the specimen, due to damage in trawl net, further description or specific determination might be misleading.

[*Published 30th October, 1906.*]

TETRAROGE GYMNODERMA n. sp.

TETRAROGE MONACANTHUS n. sp.

P. McManus del et lith.

CYTTOSOMA VERRUCOSUM

With ventral view of ventral fins and large lateral scales of another specimen.

Marine Investigations
- outh Africa.

P.M.ᶜMaous del.

PSEUDORHOMBUS MACULATUS Gen. et sp. n.

With ventral view of ventral fins.

Marine Investigations
South Africa.

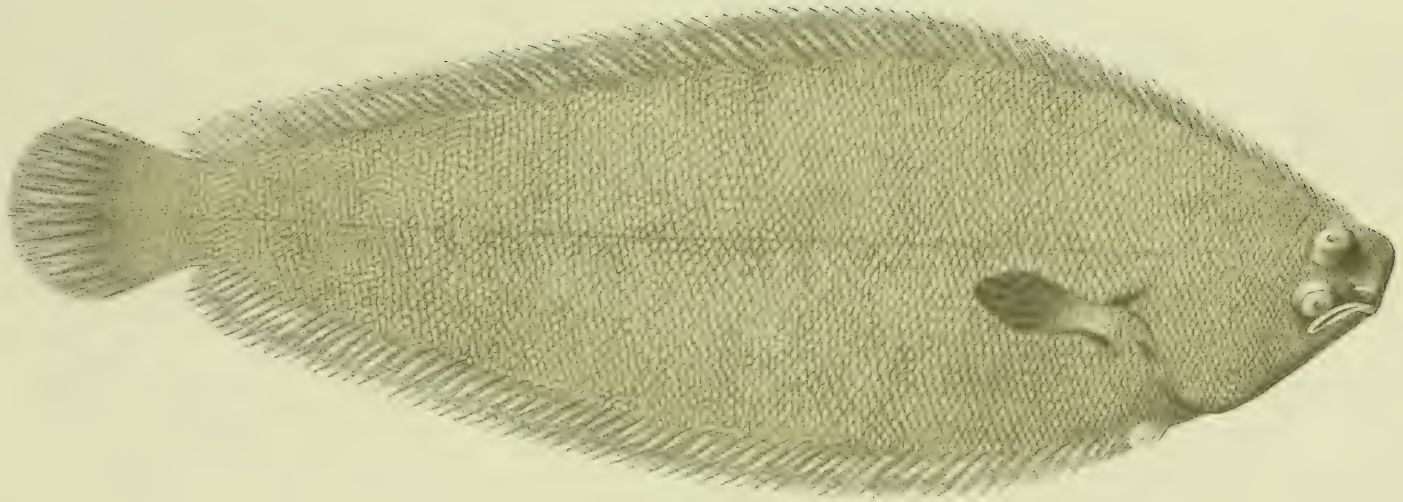
P.M.Pharaoh del. et lith.

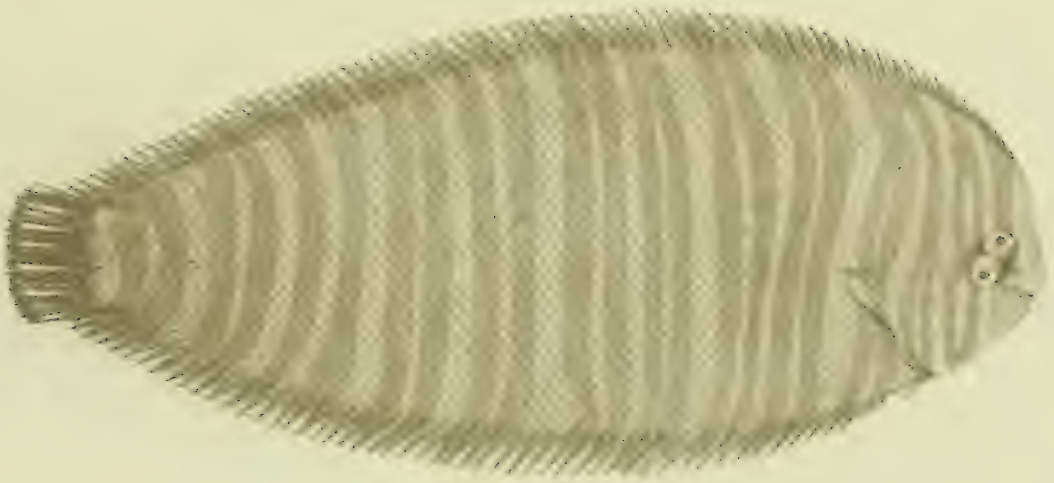
NEOCYTTUS RHOMBOIDALIS Gmel. sp. n.

P.McManus, del.et lith.

LÆMONEMA GLOBICEPS n.sp.

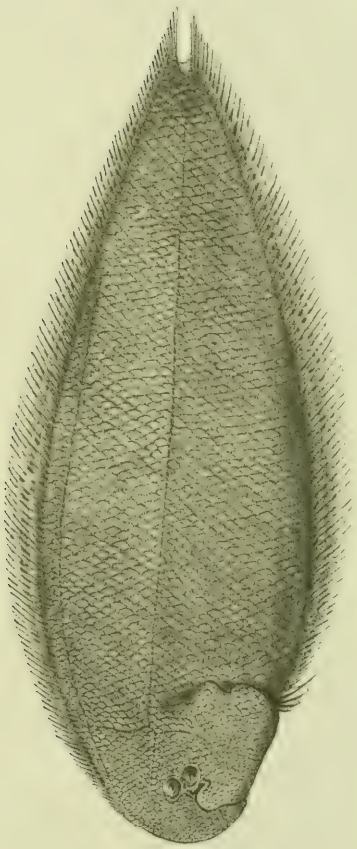
Marine Investigations
South Africa





P.M.S. Marais del. et lith.

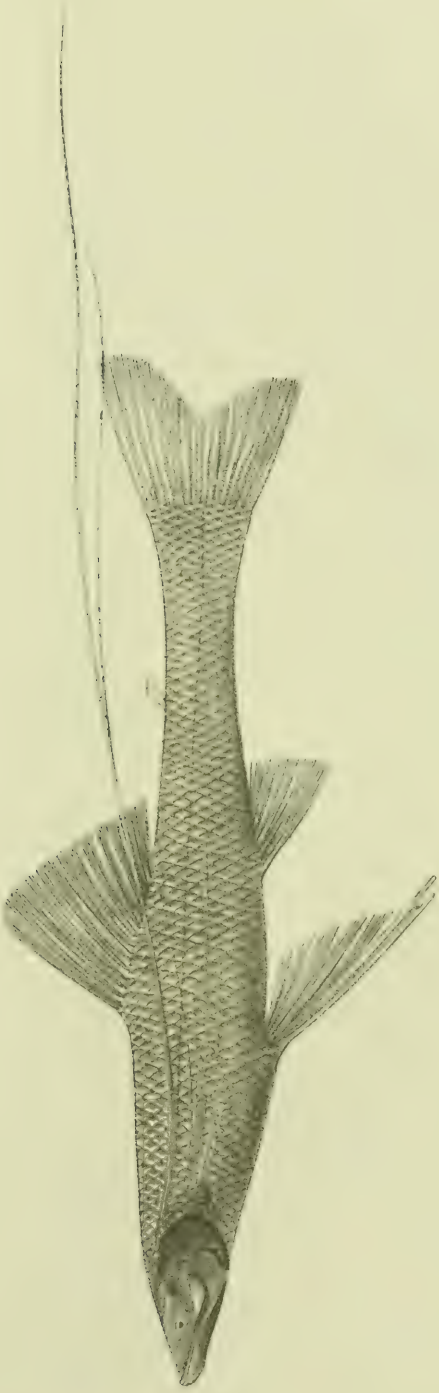
SYNAPTURA REGANI

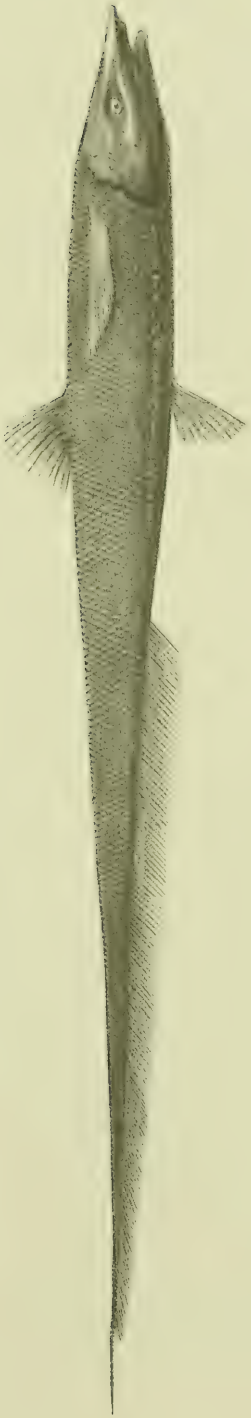


P.McManus del.et lith.

PLAGUSIA MARMORATA var. africana.

BATHYPTEROIS FILIFIRUS n. sp.





A NEW SPECIES OF

CEPHALODISCUS

(C. GILCHRISTI)

FROM THE

CAPE SEAS.

BY

W. G. RIDEWOOD, D.Sc.,

Lecturer in Biology at St. Mary's Medical School, University of London.

The material here described consists of 19 specimens (*i.e.*, pieces of colony) obtained on nine different occasions in the Cape Seas, mostly at depths of about 30 fathoms, although some of them were dredged from greater depths. The specimens were dredged by Dr. J. D. F. Gilchrist, and sent to Professor E. Ray Lankester, Director of the Natural History Museum, London, to whom I offer my thanks for his kindness in allowing me to examine and describe them. By way of recognition of the service which Dr. Gilchrist has rendered to science by his successful efforts to obtain this *Cephalodiscus* in quantity after his interest had been aroused by the dredging of a small piece of it, I name the species *C. gilchristi*.

In the following list of the material I distinguish the various specimens by the numbers appended to them by Dr. Gilchrist, or his assistant, at the time of dredging. The finest specimen is that numbered 18551, and of this a photograph of the natural size is reproduced in plate 1 ; the other pieces are all small, rarely consisting of more than one branch each. Dr. Gilchrist has been at great pains to harden these smaller pieces of material in various fixing fluids of acknowledged efficiency, so that the polypides might be in good condition for histological investigation.

Specimen 1945 ; January 10th, 1900 ; Cape St. Blaize, N. by W., 3 miles ; 30 fathoms ; bottom, mud ; fixed in 3 per cent. formalin, and transferred to 70 per cent. alcohol.

Specimen 10265 ; October 11th, 1900 ; Knysna Heads, N.E. ¾ E., 12½ miles ; 47 fathoms ; bottom, rock ; fixed in 3 per cent. formalin, and transferred to 70 per cent. alcohol.

Specimen 13203 ; July 30th, 1901 ; near East London, Cove Rock, N.W. ¾ W., 13½ miles ; 80-130 fathoms ; bottom, coral and rock ; fixed in 3 per cent. formalin, and transferred to 70 per cent. alcohol.

Specimen 14273 ; February 19th, 1902 ; Cape St. Francis, N.E. by E. ½ E., 36 miles ; 70 fathoms ; bottom, rock ; fixed in 3 per cent. formalin, and transferred to 70 per cent. alcohol.

Specimen 18551 ; September 13th, 1904 ; Cape St. Blaize, N.W. by W., 5 miles ; 31 fathoms ; bottom, mud ; fixed in 7½ per cent. formalin, and transferred to 70 per cent. alcohol.

Specimen 18551A ; selected branches of the last in which the polypides were abundant ; fixed in osmic acid 1 per cent. solution for 5–10 minutes, washed for several hours in distilled water, and transferred through grades of alcohol up to 90 per cent.

Specimen 18612A ; October 18th, 1904 ; Cape St. Blaize, W. by N., 5 miles ; 29 fathoms ; bottom, fine sand ; procured by large trawl, and hauled up off Cape St. Blaize, N.N.W., 8 miles ; 38 fathoms ; bottom, fine sand ; fixed in glacial acetic acid for 15 minutes ; washed in 50 per cent. alcohol for 8 hours, and transferred to 70 per cent. alcohol.

Specimen 18612B ; material as above ; fixed in absolute alcohol, 24 hours, and transferred to 70 per cent. alcohol.

Specimen 18612C ; material as above ; fixed in fluid as follows : corrosive sublimate 7 grammes, distilled water 100 cc., acetic acid 1 cc. ; after 15 minutes, washed in 70 per cent. alcohol, and transferred to more 70 per cent. alcohol.

Specimen 18633D ; October 20th, 1904 ; Cape St. Blaize, N., 5 miles ; 34 fathoms ; bottom, mud ; procured by large trawl, and hauled up off Cape St. Blaize, N.E. ½ E., 6 miles ; 30 fathoms ; bottom, mud ; fixed in equal parts of sea water and Flemming's solution (5 per cent. acetic acid added to osmic acid and chromic acid solutions at time of using) ; after 24 hours, removed to fresh water, frequently changed, for 24 hours ; then 30 per cent. alcohol, 6 hours ; 50 per cent. alcohol, 9 hours ; and finally 70 per cent. alcohol.

Specimen 18633E ; material as above ; fixed in Perenyi's fluid, 6 hours ; washed in 70 per cent. alcohol, 24 hours ; transferred to 70 per cent. alcohol.

Specimen 18633F ; material as above ; fixed in glacial acetic acid, 20 minutes ; washed in 50 per cent. alcohol, and transferred to 70 per cent. alcohol.

Specimen 18633G ; material as above ; fixed in corrosive sublimate and acetic acid solution (for formula see specimen 18612C), 24 hours ; 30 per cent. alcohol, 3 hours ; 50 per cent. alcohol, 24 hours ; finally 70 per cent. alcohol.

Specimen 18633H ; material as above ; fixed in absolute alcohol, 24 hours, and transferred to 70 per cent. alcohol.

Specimen 18655I ; October 26th, 1904 ; Cape St. Blaize, N.W., 6 miles ; 35 fathoms ; bottom, mud ; procured by large trawl, and hauled up off Cape St. Blaize, N.N.W., 6 miles ; 35 fathoms ; bottom, mud ; fixed in freshly-made Perenyi's fluid, 6 hours ; washed in 70 per cent. alcohol, 24 hours, and transferred to 70 per cent. alcohol.

Specimen 18655J ; material as above ; fixed in strong alcohol (absolute alcohol which had been previously used for fixing specimens), 24 hours, and transferred to 70 per cent. alcohol.

Specimen 18655K ; material as above ; fixed in Flemming's fluid which had been previously used, 24 hours ; washed in several changes of water, 24 hours ; 30 per cent. alcohol, 6 hours ; 50 per cent. alcohol, 6 hours, and transferred finally to 70 per cent. alcohol.

Specimen 18655L ; material as above ; fixed in freshly-made Flemming's fluid (see notes to specimen 18633D), 24 hours ; several changes of water, 24 hours ; 30 per cent. alcohol, 6 hours ; 50 per cent. alcohol, 6 hours ; finally into 70 per cent. alcohol.

Specimen 18663 ; October 28th, 1904 ; Cape St. Blaize, W.N.W., 5 miles ; 31 fathoms ; bottom, mud ; procured by large trawl, and hauled up off Cape St. Blaize, N.W. by N., 5½ miles ; fixed in absolute alcohol 24 hours ; and transferred to 70 per cent. alcohol.

Tubarium.—The finest piece of *Cephalodiscus gilchristi* sent to the Natural History Museum, London, is that of which a photographic reproduction is given in plate 1. It is the specimen marked 18551 in the preceding list of material. It measures roughly 190 mm. by 110 mm., and is of a reddish brown tinge. This piece was sent in a 7½ per cent. solution of formalin in a tinned iron box, and the fluid on arrival was turbid and red, owing to the rusting of the iron. The rusty tinge of the specimen has diminished since it was placed in alcohol, but it has not disappeared. The colour of other specimens fixed in formalin and transferred to alcohol, and of those fixed in alcohol, is pale brown.

Specimen 18551 consists of an attached base and branches. The base, shown in the left-hand lower corner of the plate, measures 60 by 45 mm. across. There is no indication of the object to which the colony was attached ; the base has come

away clean. The base is massive, of uniform character, without spines and without ostia. The branching stems that arise from the base are roughly circular in section ; the parts nearer the base are thicker than those more remote. The thicker branches are about 10 mm. across (not including the spines) ; they have shorter spines than the more terminal branches, and fewer ostia : the ostia are more abundant on one side than on the other. In the more terminal branches the width varies from 5 to 8 mm., and the apertures are more uniformly distributed. The distance from one branch to the next is about 30 mm., but it may be as much as 55 mm., or as little as 17 mm.

The cross-bars joining up adjacent branches of the colony which M'Intosh noticed in *Cephalodiscus dodecalophus* ("Challenger" Reports, *Cephalodiscus*, 1887) are here a marked feature of the tubarium. One such bar is seen towards the left-hand upper corner of plate 1, and a thicker one at some distance above the centre of the plate. They are solid, and have few or no apertures ; they measure from 4 to 8 mm. across. They act either as tie-rods to prevent the several branches of the colony from breaking apart, or else as bridges for the polypides to pass along from branch to branch. Although, on the whole, the polypides reside in the cavities of the tubarium, yet one must admit the existence of migrating polypides, otherwise it is impossible to explain the increase in the length of the branches of the tubarium, the production of lateral branches, and the formation of the cross-bars and the spine-like processes of the tubarium. Possibly the wandering polypides are in all cases young ones which have only recently severed their connection with the stolon of their parent, and have left the parental home and are in search of a suitable position in the colony in which to settle down and secrete protecting tubes of their own.

When the cross-bars are at all thick, they include embedded in their midst one or more of the spines which happened to occur in the neighbourhood. In the transverse section shown in fig. 8, plate 3, it is evident, from the way in which the strata of test are disposed, that the spine *a* is the organic axis, and remained for some time the only embedded spine of the cross-bar. Later, however, the spines *b* and *c* became entangled and buried, and still more recently the spine *d*.

Although in the case of specimen 18551 Dr. Gilchrist states that a great many of the polypides fell out and collected at the bottom of the vessel when the colony was plunged into formalin, a great many still remain in the tubes of the tubarium, and entangled among the spine-like processes (see plate 1).

The spines of the tubarium are numerous, fairly flexible, slender, straight, occasionally forked. They measure ·3 to ·4 mm. in thickness, and they taper but slightly ; they frequently attain a length of 13 mm., although the majority are shorter, and measure 9 or 10 mm. beyond the surface of the tubarium. The spines are darker in tint than the general test, and can be traced into the latter for a considerable distance. The spines are solid ; the superficial layer has a deeper tint than the central part, so that on a casual examination the spines appear hollow. Critical inspection, however, shows that the spine-axis has been developed intermittently by successive additions to its extremity, the increments being all of the same shape, and approximately of the same size. The successive apices are, with the exception of the first few at the embedded base of the spine, all of the same width, and this accounts for the width of the spine remaining the same all the way along (see figs. 9–11, plate 3).

The ostia or apertures of the tubarium are numerous, fairly closely set and uniformly scattered over the lateral and terminal surfaces of all the branches except the basal ones (fig. 1, plate 2). They are oval in shape and measure 1·2 or 1·3 mm. by 1 mm. across. In fig. 7, plate 3, is shown an end view of a branch, the view that one would obtain when looking in the direction of the axis of the branch. The pear-shaped areas are the ostia, the small circles are the stumps of spines, cut short in order that their relations to the ostia may be studied. At *a* and *b* it will be seen that there is one spine between two ostia, but in the other cases each tube has a spine of its own.

Except in the case of terminal groups, such as that shown in fig. 7, plate 3, the spines are not at first sight definitely related to the ostia ; as a rule each ostium has one, perhaps two, or even three spines arising from its margin, but some of the spines project form the surface of the tubarium between the ostia. The spines that arise from the margin of the ostium may arise from any part of that margin, *i.e.*, not necessarily towards the axis of the branch, nor on the peripheral side, nor laterally as regards the ostium. Sometimes two tubes project together from the general surface of the tubarium as a double peristome, and these may have a single spine between them, or may have two, or three spines. The number of spines on a branch is probably equal to the number of ostia, but one can only in certain cases recognise a definite relation between tubes and spines.

The tubes occupied by the polypides are all blind at their deep ends, and each is occupied by one polypide and its buds, so that the species *Cephalodiscus gilchristi* comes within the

sub-genus *Idiothecia* (see Reports "Discovery" Expedition, *Cephalodiscus*, 1906, p. 7). The tubes are 1 to 1.2 mm. wide, rarely 1.4 mm., and they vary in length from 2.5 to 5 mm. They are of uniform diameter, but in some cases the opening or ostium is a little wider than the tube itself; the blind end is usually blunt (see plate 3, figs. 9–11). The inner or blind ends of the tubes curl in and out among one another, but the more superficial parts are straighter (figs. 2 and 3, plate 2).

The shortest tubes are to be found at the extremities of the branches (fig. 10, plate 3). Here the paler, softer, and presumably newer test that agglomerates the tubes and spines together is less abundant than elsewhere. It would seem that the young polypides of the colony crawl over the surface of the tubarium, and, on coming to rest at the end of a branch, first secrete short tubes and spines, and subsequently secrete the softer test which fills in the intervals between the projecting parts of the tubes (peristomes) and spines. The tubes are lengthened by additions at their mouths or ostia until they attain their maximum length of 5 mm., and soft test is deposited around them *pari passu* so as to envelop them up to the mouths, and to cover in more and more of the basal parts of the spines. This may explain why the spines are shorter towards the rooted end of the tubarium than near the distal ends: they are more submerged in the common test.

It not infrequently happens that a spine begun in relation with one tube becomes secondarily related to another and younger tube, as though a settling polypide, finding itself in the vicinity of a projecting spine, builds up its tube against it, and dispenses with the formation of a spine of its own. The relations of spines to tubes are best studied by reference to the ends of branches of the tubarium, and the following interpretation of three particular cases may serve to render the relations clearer than a generalised statement would.

In fig. 9, plate 3, is shown a group of four tubes and five spines cut from the end of a branch. The cut surface is represented by the irregular line at the bottom of the figure. The oldest spine here appears to be that marked *a*; it is darker in colour than the others; it extends all the way through the group of tubes under consideration, and in all probability it was not originated by any of the polypides occupying these tubes, although the more terminal parts of the spine may have been put on by one or more of them. The tube which runs alongside the spine *a* is more remote from the observer than the spine itself, and has its aperture (*b*) facing away. The polypide which secreted and inhabited this tube commenced to construct it against the side of the spine *a*, and only com-

paratively recently produced a spine of its own (*c*). This spine has its origin against the side of the spine *a*, and is not an independent spine like *d*, for instance. It may here be mentioned that in all cases of "forked" spines there is a secondary spine applied to the side of a primary spine, as is the case in *Cephalodiscus hodgsoni* ("Discovery" Reports, 1906, p. 51, and plate 4, fig. 21).

The next tube in point of age is that marked *e* in fig. 9. Before the tube had attained more than half its present length, the polypide began to secrete a spine (*f*) by applying to the side of the tube first blunt mounds of test, and later steep deposits, of the shape of projectiles. Shortly after this another polypide settled by the side of tube *e* and spine *f*, and secreted a tube *g*, with a spine of its own (*d*) applied obliquely to the tube. Later still, another polypide settled down between the spines *f* and *a*, and secreted a tube (*h*), which is still in a comparatively early stage of construction, being short, and provided with a delicate projecting peristome. The polypide of tube *h* had, however, at the time when the specimen was dredged, already produced a spine *j*, which it began to secrete, not against the side of its tube as was the case with the polypides of tubes *e* and *g*, but against the side of the spine *f*, much as the polypide of tube *b* based its spine (*c*) against the side of the spine *a*. Thus it results that the four tubes are related to five spines; but one of the spines (*a*) was there in the first instance, and belonged primarily to an older tube, not shown in the figure, so that, as far as the group under consideration is concerned, there are as many spines as tubes.

Fig. 10 represents a group of five tubes which I interpret as follows. The shortness of the tubes implies that they are only recently formed, and the uniform character of the tubes that the five polypides settled almost at the same time. The spine *a* is probably a spine which was present before the advent of the five polypides in question, and three of the tubes are built against it, namely, *b*, *c* and *d*. The polypide of either *c* or *d*—possibly both—originated a new spine (*e*) against the side of the initial spine (*a*); the polypide of *b* seems to have appropriated to itself the spine *a*, perhaps in conjunction with the polypide of *c*; the polypides of tubes *f* and *g* have produced spines of their own (*h* and *j*), originating on the sides of their tubes.

Fig. 11 is interesting as an example of a branch-end with very little of the common test between the tubes. The consequence of the deficiency of this material makes the greater part of the tubes *a* and *b* to stand out from the general tubarium in the form of "peristomes," which circumstance shows that

the characters of the peristomes are not in all cases of value for purposes of discrimination of species. In the present species, for instance, the tubes have either their ostia flush with the surface, or else they project a little from the surface. When, however, as in the piece of tubarium shown in fig. 11, the branch is growing so rapidly that the intervals between the tubes have not been filled up by common test, the tubes stand out boldly, and one would have to apply to such a piece the expression "peristomes long." This condition is exceptional, it is true, and would probably have been of short duration, but it indicates a difficulty in the satisfactory employment of the characters of the peristomes for distinguishing one species of *Cephalodiscus* from another.

In the piece of the colony shown in fig. 11 the spine *c* is, I take it, older than any of the three tubes shown, and was originated by a polypide whose tube does not appear in the piece selected, being set lower down the branch. The polypide occupying the tube *b* utilised this spine as a support for its tube, and originated from the side of the spine two spines of its own, *d* and *e*, the latter only in the initial stages of its formation. The polypide of tube *a* started a spine of its own (*f*), with its base against the side of the tube; and the polypide of the tube *g* produced two spines, one (*h*) set upon the side of the spine *c*, and the other (*i*) originating from the side of the tube.

Polypides.—The polypides of *Cephalodiscus gilchristi* do not present any remarkable peculiarities. The shield has a dark band around its front and side edges (fig. 4, plate 2, *b.s.*) which is peculiar to the species, but the red line (*r.l.*) and other features do not call for special comment. The shield is a very mobile organ judging from the numerous shapes in which it is found in the preserved material; and in buds especially is the posterior flap found either directed backward ventral to the mouth and parallel to the post-oral lamella (fig. 5, plate 2), or turned forward so as to be ventral to the main portion of the shield (fig. 6), or set at any angle intermediate between these two extremes.

The twelve plumes stand out rather distinctly in well-preserved polypides, and the ends of the individual plumes appear more pointed (fig. 4, plate 2, *pl.*) and less bunched than those of *C. dodecalophus* and *C. hodgsoni*, which they otherwise most nearly resemble. The body is swollen, the posterior end moderately pointed when seen from the ventral or dorsal aspect. The stomach causes a bulging of the two sides of the body (*ga.*); and in front of these projections there are in mature polypides a pair of others (*go.*), due to the gonads. The course of the rectum can usually be traced as a shallow

mound along the dorsal surface of the body; the anus is a large gaping slit at the anterior end of the visceral mass.

The gill-slit is situated postero-ventrally to the collar canal on each side of the body; it is an oblique slit, sloping antero-ventrally as seen from the outside. It is only slightly larger than the collar pore, and is set at about the same transverse level of the body as the red line of the shield in cases where the posterior lobe of the shield is backwardly directed. The side of the post-oral lamella flaps over the external openings of the collar canal and gill-slit.

The stolon arises, on an average of cases, in the position in which it is shown in fig. 4, plate 2, but its point of origin is not constant, being sometimes nearer the mouth and sometimes nearer the hind end of the visceral mass than is shown in the figure. The stolon is longer than the whole body, plumes included, and may be as much as twice the length of the body if the polypide died with its stolon well extended. In the latter case the stolon is thin and free from superficial wrinkles. The number of buds usually found on the end of the stolon varies from two to five.

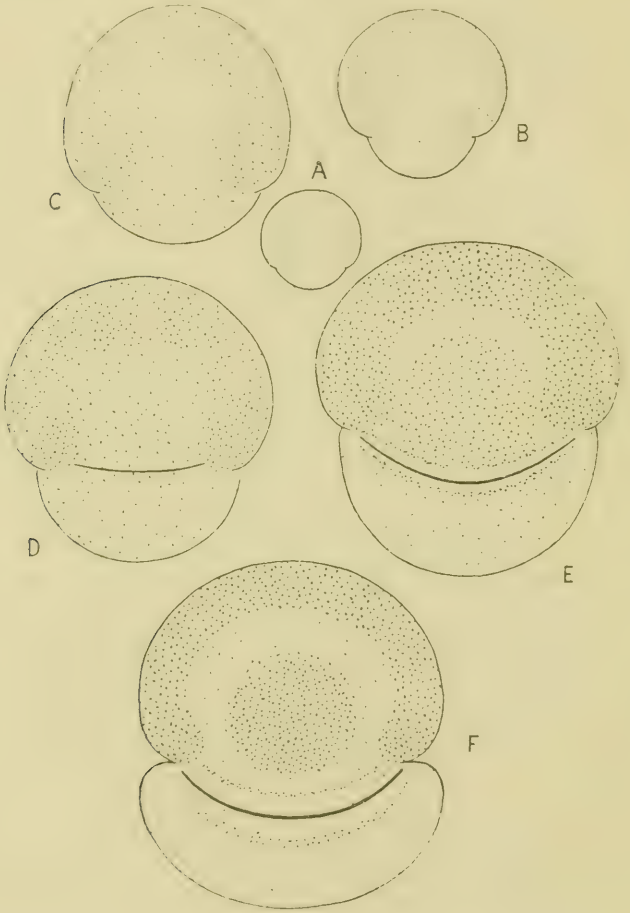
The average measurements of the polypides of *Cephalodiscus gilchristi* are as follows:—From end of visceral mass to anus, 1 mm.; from end of visceral mass to front of buccal shield, 1·5 mm.; from end of visceral mass to front of plumes, 1·8 mm.

Parasites.—Occurring very commonly in the stomach of *C. gilchristi* is a parasitic Copepod which almost fills the cavity and leaves very little room for food material. As a rule but one Copepod is found in the stomach; in one case two were found, but neither of these was fully grown. Sometimes the stomach contains an adult female and four free eggs, or a female and four embryos, or four embryos of a later stage, without the mother. Mature females are common, but no adult male has been encountered; possibly the adult male is free-living.

Dr. W. T. Calman has been good enough to examine this parasite for me, and he points our that it comes within the family Ascidicolidæ, Copepods parasitic mainly in the gut of Tunicates, and that it is most nearly allied to *Enterognathus*, a parasite described by Giesbrecht from the gut of *Comatula*. The parasite of *Cephalodiscus* is more degenerate than *Enterognathus*. The segmentation of the body is not clearly marked, the jaws are much reduced, the thoracic limbs are stout and stunted, and there are no projecting egg-sacs.

Buccal Shield.—The buccal shield of a well-expanded polypide of *C. gilchristi* (see text-fig. 1, F) measures about ·66 mm.

wide, and ·75 mm. high (*i.e.*, antero-posterior diameter). The proportions vary considerably, however, some shields being higher and narrower than the average, others being shorter and wider. The measurements above stated were arrived at by striking the average of the measurements of twenty-four well-expanded shields removed from the polypides and mounted in glycerine for microscopic examination.



Text-Fig. 1. Buccal shields of *Cephalodiscus gilchristi* in various stages of development. A,—the shield of a young bud. B,—shield of an older bud. C,—shield of an older bud than the last ; no plume-rudiments were recognisable in this bud. D,—shield of an older bud than the last ; the first two pairs of plumes of this bud were recognisable as hemispherical knobs ; the red line of the shield has now appeared. E,—shield of a fairly old bud ; the first three pairs of plumes of this bud were clavate and devoid of pinnules, the fourth pair were hemispherical knobs. F,—shield of an adult polypide. All the figures are drawn to the same scale, namely, × 60.

The posterior flap or lobe of the shield is thinner than the rest, but, on an average of cases, is as wide as the main part; there is a well-marked lateral notch between the posterior flap and the main portion of the shield. The pedicle or stalk of the shield is approximately central; its position is indicated in text-fig. 1, F, by the central dark area. The red line of the shield is usually curved, and is more or less parallel to the posterior edge of the hinder lobe; in text-fig. 1 it is represented by a firm black line. The proportion existing between the average measurement from the centre of the red line to the front edge of the shield and that from the centre of the red line to the hind edge is about 20 to 7.

It is a characteristic feature of the bud development of both *Cephalodiscus* and *Rhabdopleura* that the buccal shield differentiates very early; the rapid increase in the size of the shield in the early stages of development of the buds of *C. gilchristi* is even more striking than it is in the species *dodecalophus*, *nigrescens* and *hodgsoni*. In the earliest stages there is no posterior lobe; when it does appear (text-fig. 1, A) it is much narrower than the main portion of the shield. It is only during the very latest stages, when the bud is ripe and ready to become independent, that the width of the posterior lobe becomes approximately equal to that of the rest of the shield, as it is in the adult (text-fig. 1, F). The red line appears at about the stage when the first two pairs of plume-axes can be recognised (text-fig. 1, D). The lateral notch of the shield, due to a widening of the posterior lobe, does not become strongly marked until after the stage has been passed when four pairs of plume-axes are recognisable. In text-fig. 1, E, it will be noticed that the posterior flap is still comparatively narrow.

It is rather remarkable that the shields of very old buds, namely, those with five or six pairs of plumes, but with imperfectly-developed pinnules, are larger than the shields of adult polypides. A shield of such a stage would be intermediate in general characters between those shown in text-figs. 1, E and F, but would be larger than either. The explanation of this circumstance is probably that in the adult shield there is a greater development of muscular tissue present than in old buds, and that what appear to be fully expanded shields of adults are really less extended than are those of the old buds; by virtue of their greater muscularity the shields of the adults have become fixed by the killing and preserving fluids in a partially contracted state.

Around the front edge and sides of the main portion of the shield, extending as far back as the lateral notch, and not continued on to the posterior lobe or flap, is a broad dark margin (fig. 4, plate 2). The width and extent of this margin are

indicated in text-fig. 1, F, by heavy dotting. The cells composing the dark rim are pigmented cells, similar to those so widely spread in the ectoderm of *C. nigrescens* ; they occur only in the marginal region of the dorsal surface of the shield (see text-fig. 3, *pg.*), and in fig. 4, plate 2, and text-fig. 1, F, are being viewed through the partially-transparent ventral wall of the shield. The cells when seen in bulk with the naked eye or with a low magnification appear blackish, but when examined with high powers of the microscope they are brown or yellow, in polypides which have been killed in formalin ; but in sections stained with Erlich's haematoxylin and eosin of polypides killed in osmic acid solution the pigmented cells are red, while in polypides killed in Flemming's fluid and in those killed in Perenyi's fluid the cells are colourless.

The pigmented cells stand high, and among them are colourless refractive beads (text-fig. 3, *r.b.*) similar to those first known in the end bulbs of the plumes of *C. dodecalophus*, but which investigation of *C. nigrescens* shows may occur on almost any part of the body. These I take to be the globules of the test material which have been accumulating in the cells, and coalescing, in the same manner as the globules of mucus in a goblet cell. On this assumption, the dorsal surface of the edge of the shield is in *C. gilchristi* the part of the body which is more particularly concerned with the secretion of the tubarium.

Plumes.—The plumes of *C. gilchristi* are six pairs in number. Occasionally only ten or eleven plumes can be found, but this may be due either to the accidental loss of one or more of the plumes, or, more usually, to one or both plumes of the sixth pair being retarded in their development. The plumes of *Cephalodiscus* develope successively, in pairs, and not simultaneously ; and the sixth pair, or one of the pair, may have failed to develope beyond an early stage at the time when the polypide was killed. Whether the plumes in question would have become larger had the polypide been allowed to live on is doubtful, because such a polypide is of full size, and possesses mature gonads. It is much more likely that the rudimentary plumes, sometimes no more than pinnule-less, club-shaped bodies situated near the bases of the plumes of the fifth pair, are permanently arrested.

The tip of the plume-axis is only in rare cases (text-fig. 2, B) swollen in a manner reminding one of the terminal bulbs of *C. dodecalophus* and *C. hodgsoni*. The axis in the great majority of instances terminates in the manner shown in text-fig. 2, A and C ; the tip is only slightly thicker than one of the pinnules, and it shows no transparent, highly refractive beads.

A moderately well-extended plume measures about ·9 mm. in length, a well-extended plume 1·1 mm. The maximum

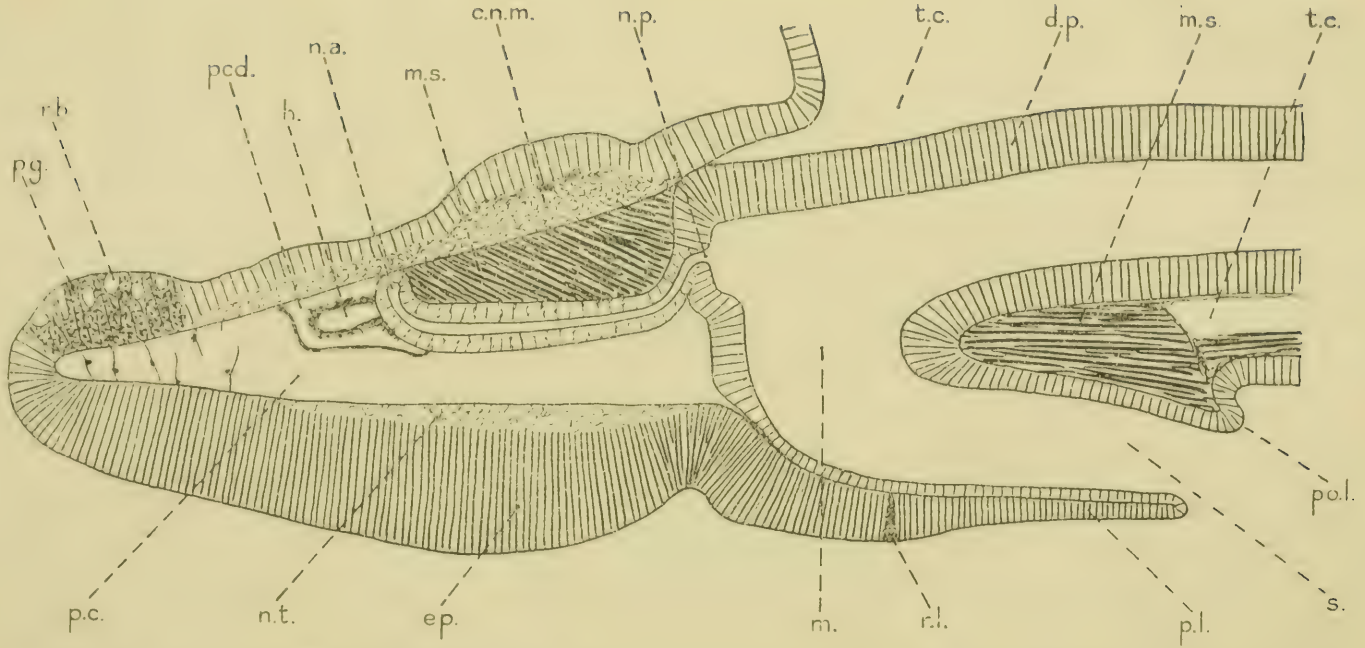
length observed was 1·5 mm. The pinnules are arranged in two rows along the axis, and there are from 25 to 30 in each row. Those near the tip are usually short, but not always as short as those shown in text-fig. 2. The longest pinnules occur at about one-third of the length of the plume-axis from the base, and these measure about ·4 mm. in length. The tips of the pinnules are very slightly enlarged, and are frequently found incurved.

General Internal Anatomy.—The general internal anatomy of *Cephalodiscus dodecalophus* has been worked out in great detail by Harmer, Masterman, Schepotieff, and others,* and in the monograph on *Cephalodiscus* in the Report of the "Discovery" (Antarctic) Expedition I have given a series of diagrammatic sections of the body of *C. nigrescens*, taken through structures of particular interest, which with the ac-

Text-Fig. 2. A,—side view of a moderately expanded plume of *Cephalodiscus gilchristi*; the pinnules of one side only are shown. B,—exceptional form of termination of the plume-axis; cases of swollen terminations such as this are rare. C,—end portion of a normal plume seen from the aponeural aspect. (× 50.)

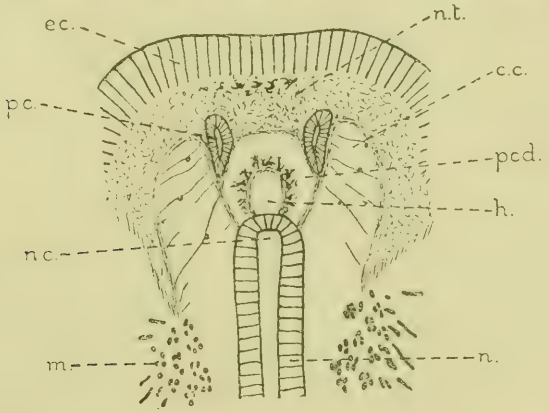
companying text afford a tolerably complete account of the anatomy of that species. As compared with these two species, the polypide of *C. gilchristi* does not present any striking peculiarities, and this being so, it does not call for a detailed description. The following have been recognised in sections of the polypides of *C. gilchristi*, and they so closely resemble their equivalents in the earlier investigated species of *Cephalodiscus* that they may be dismissed with a mere mention :—a pair of proboscis canals, a pair of collar canals, collar-canal muscle (cross-striped fibres), a pair of gill slits, pleurochords, post-oral lamella, divisions of the coelom, coelomic trabeculæ, muscles of the buccal shield, of the collar region, trunk region and stolon, and nerve tracts.

*A full bibliography is given in the Report of the "Discovery" Expedition.



TEXT-FIG. 3. Median longitudinal section of the antero-ventral part of a polypide of *Cephalodiscus gilchristi*. *c.n.m.*—central nerve mass; *ef*—tall narrow epithelial cells of the face of the buccal shield; *d.p.*—dorsal wall of pharynx; *h.*—cavity of heart; *m*—mouth; *m'*—muscle fibres forming septum separating the right and left collar cavities; *not.*—cavity of the anterior end of the notochord; *n.p.*—cavity of the posterior end of the notochord, where it opens into the pharynx; *r.l.*—nerve tract of the ventral wall of the buccal shield; *p.c.*—proboscis cavity, or cavity of the buccal shield; *pcd.*—pericardial cavity; *p.g.*—pigmented cells of the buccal shield; *p.l.*—posterior lobe of the buccal shield; *p.o.l.*—posterior edge of the post-oral lamella; *r.b.*—retractive bodies; *r.l.*—red line of the buccal shield; *s.*—space between the post-oral lamella and the posterior lobe of the buccal shield, leading into the mouth (*m*); *t.c.*—trunk cavity.

The notochord is interesting as being particularly long and bent. Several polypides were cut into serial sections, and in all of them the anterior and posterior ends of the notochord appeared more or less sharply bent (text-fig. 3, *n.a.* and *n.p.*). The cavity of the notochord is very distinct; the thickness of the wall of the notochord is least in the basal parts. The apex of the notochord is in contact with the thin skeletal layer that lies immediately internal to the nerve tract of the dorsal surface of the buccal shield. Between the dorsal surface of the middle part of the notochord and the same sheet of skeletal connective tissue is a septum, which separates the right and left collar cavities, and is flanked on each side by a sheet of muscle, the fibres of which continue down the right and left sides of the mouth, and become nearly median again as they



Text-Fig. 4. Section of the pericardial region of the body of *Cephalodiscus gilchristi*, cut parallel to the face of the buccal shield. *c.c.*—anterior horn of collar cavity; *ec.*—tall ectoderm cells of the dorsal wall of the buccal shield, cut obliquely; *h.*—cavity of the heart; *m.*—muscle fibres cut transversely and obliquely; *n.*—wall of notochord; *n.c.*—cavity of notochord; *n.t.*—nerve tract; *p.c.*—proboscis canal, cut transversely; *pcd.*—pericardial cavity. In this diagram, and in text-fig. 3 an attempt has been made to place the pen-strokes in such positions and at such distances apart as shall give the general appearance and depth of tint of the several tissues as they appear in sections examined under the microscope; the small areas enclosed by the pen-strokes are not intended to represent cells, except in a most diagrammatic manner.

attach themselves to the sides of the median septum between the right and left collar cavities in the region of the post-oral lamella (see the two tracts marked *m.s.* in text-fig. 3). The dorso-anterior wall of the pharynx touches the skeletal layer that lies immediately beneath the hinder part of the central nerve mass.

The heart is entirely in advance of the notochord, and in almost all cases is well dilated. The relations of the pericardium

may be seen by reference to text-figs. 3 and 4, in which the pericardial cavity is marked *pcd*. Text-fig. 4 has been introduced into the present communication because it shows well the manner in which the anterior blind horns of the collar cavities (*c.c.*) project forward, and the position which the proboscis canals (*p.c.*) occupy between the pericardium and the anterior horns of the collar cavities. The part marked *n.c.* in this figure is not the true extremity of the notochord ; the tip of the notochord is bent dorsally as shown in text-fig. 3, and does not therefore come in the plane of the section represented in text-fig. 4.

Gonads.—All the polypides of *C. gilchristi* that have been examined possess either two ovaries or two testes ; no hermaphrodite individuals like those of *C. nigrescens* and *C. hodgsoni*, possessing one ovary and one testis, were met with.

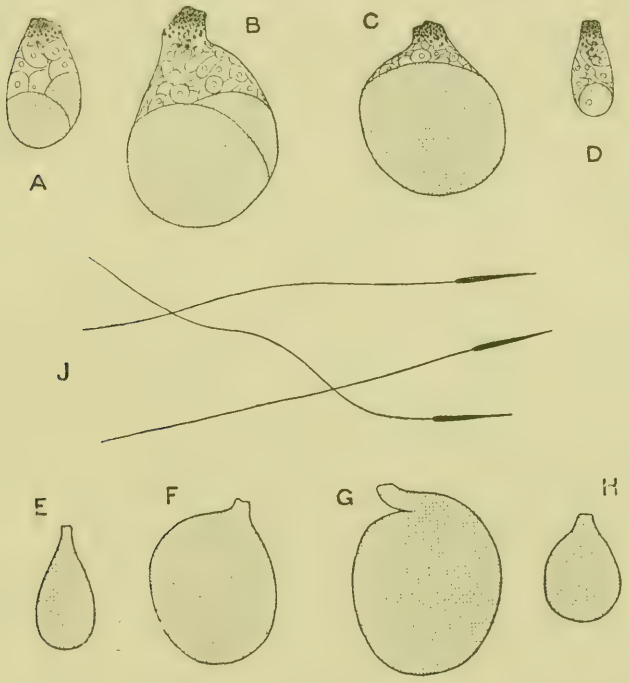
Ripe female polypides do not, as a rule, have two large ovaries ; there is usually a large ovary and a comparatively small one. In text-fig. 5, A and B represent the two ovaries of one polypide drawn to the same scale of enlargement, and C and D represent the two ovaries of another polypide. If the female is immature, the two ovaries are of the same size. As in other species of *Cephalodiscus*, the ripe ova of *C. gilchristi* are large in comparison with the size of the ovary, and they are heavily charged with yolk. A ripe ovum is seen in text-fig. 5, C, and two in B. All ovaries, whether mature or not, have a short pigmented duct. The duct is shown uppermost in the figures A–D, and the pigmented cells are represented in these figures by black dots. In the polypides preserved in formalin the pigment is bright red, in others it is brownish, or even dark brown. In some cases, as in *C. hodgsoni* ("Discovery" Reports, pl. 5, figs. 44, 45), the red pigment is not confined to the duct, but occurs throughout the ovary.

The testes of the male have no red cells in their ducts. They vary in size according to the maturity of the individual, and the two testes of one polypide are usually equal in size. Examples of testes dissected out of four different polypides are shown in figures E–H of text-fig. 5. Figure G represents the largest testis found during the investigation. On teasing up some of the testes, and staining the contents, perfect spermetazoa may be seen. They have long, sharply-pointed heads, and long tails (text-fig. 5, J).

Free ova occur in the tubular spaces of the tubarium of specimen 10265 mixed up with the buds of the occupant polypides ; also in 13203 and 18655L. They are surrounded by a thin film of transparent material resembling that of the test, and this in some cases is produced into a sort of stalk

which is confluent with the lining of the tubular cavity, and lends support to the suggestion that the envelope is not produced in any special way by the ovary or its duct, but originates from the same cells as secrete the tubarium. The usual size of the free ova is from ·4 by ·33 mm. to ·5 by ·4 mm.

As regards the distribution of the sexes, all the polypides of specimen 10265 that were examined proved to be females, and all those of 18551 were males; but I have satisfied myself by careful examination of the polypides of specimens 13203, 18633



TEXT-FIG. 5. A. and B,—the two ovaries of one polypide of *C. gilchristi*; C and D,—the two ovaries of another polypide; E, F, G, H.—testes of different polypides; J,—ripe spermatozoa. A—H are enlarged 50 diameters; J, 500 diameters.

and 18655 that the same branch of the colony may have female polypides in some of the cavities and males in the others. The colony is thus monoecious. Why the specimens 10265 and 18551 are (apparently) unisexual is difficult to explain in the case of such sedentary animals as *Cephalodiscus*; possibly the examination of a larger number of polypides from these specimens might result in the discovery of individuals differing in sex from the majority, but I was loth to sacrifice for such

purpose much of the material entrusted to me, especially as in the other cases cited above I had found males and females in different cavities, not merely of the same colony, but of the same branch of the colony.

Summary.—The principal features of the new species now under consideration may be briefly stated as follows :—

Cephalodiscus (*Idiothecia*) *gilchristi*, n. sp. Material, from the Cape Seas at depths of 30 fathoms or more. Tubarium irregularly branched, some of the branches connected by solid cross bars ; distance from one branch to the next 30 mm. on an average, extremes 55 mm. and 17 mm. Width of terminal branches, not including spines, about 5 mm., width of basal stems about 10 mm. Ostia numerous, except in the main stems and attached base. The tubular cavities of the tubarium do not communicate with one another, and each is occupied by a single polypide and its buds, of which there may be from 2 to 5. Tubes 4 or 5 mm. long, 1 to 1.2 mm. across ; each tube with a single ostium, oval, 1 by 1.2 mm. across, sessile, or in the terminal branches with short, rarely long, peristomial tube. Spine-like processes of tubarium long and slender ; many of them can be traced for a considerable distance into the tubarium, each spine accompanying one of the tubes, more or less. Length of freely-projecting portion of the spine about 10 mm., width ·3 to ·4 mm. Occasionally an ostium has no spine directly related to it, or it has more spines than one. Polypides not black, but there is a broad dark margin to the buccal shield, not continued on to the posterior lobe. Distance from end of visceral mass to end of plumes about 1·8 mm. ; ditto to front of buccal shield about 1·5 mm. ; ditto to anus about 1 mm. Plumes six pairs ; tips of the plume-axes small, not globular, without clear, refractive beads. Stomach dilated ; anal aperture large. Stolon longer than the body. Polypides male and female ; alike except as regards the gonads, and may occur in different tubes of the same branch of the colony. Free ova found in the cavities of the tubarium measure from ·4 by ·33 mm. to ·5 by ·4 mm.

Short diagnoses of *Cephalodiscus sibogae, gracilis, hodgsoni, dodecalophus, nigrescens* and *levinseni*, similar to the above summary of characters of *Cephalodiscus gilchristi*, are given in my report on *Cephalodiscus* in the " Discovery " Expedition Reports, 1906, pp. 7–11.

The seven species of *Cephalodiscus*, of which descriptions have up to the present been published, may be quickly distinguished by the characters set out in the following table.

KEY TO THE IDENTIFICATION OF THE SPECIES OF *Cephalodiscus*.

Polypides in a common cavity with numerous ostia (sub-genus *Demiothecia*),

Width of branches 2 mm. or less ; colony diminutive ; plumes less than six pairs,

Polypides black ; plumes four pairs, except in males, which have one pair only,
..... *sibogae* (Harmer, 1905).

Polypides with black pigment on stolon only ; plumes five pairs,..... *gracilis* (Harmer, 1905).

Width of branches 4 mm. or more ; plumes six pairs,

Cavity of tubarium with smooth inner surface ; distance from one branch to the next, about 10 mm..... *hodgsoni* (Ridewood, 1906).

Cavity of tubarium incompletely sub-divided by ridges and partitions of irregular shape ; distance from one branch to the next, about 22 mm..... *dodecalophus* (M'Intosh, 1882).

Polypides in separate cavities, each with a single ostium (sub-genus *Idiothecia*),

Polypides black ; plumes seven pairs,

Colony massive, width of branch 15 to 25 mm. or more ; peristomial tubes very short, each with a short blunt lip ; no spines,
..... *nigrescens* (Lankester, 1905).

Polypides not black ; plumes six pairs,

Width of branch (including peristomes) about 12 mm.; peristomial tubes longer than their width, each with a short lip ; no spines,
..... *levinseni* (Harmer, 1905).

Width of branch 5 to 10 mm. ; peristomial tubes short or absent ; spines long and slender, simple or forked,..... *gilchristi* (new species).

EXPLANATION OF THE PLATES.

PLATE 1.

Photographic reproduction of a colony of *Cephalodiscus* (*Idiothecia*) *gilchristi*; natural size. Specimen No. 18551.

PLATE 2.

Fig. 1. A branch of the tubarium of *Cephalodiscus gilchristi*, enlarged 2½ diameters. Specimen No. 13203.

Fig. 2. Longitudinal section of a branch of *C. gilchristi*, enlarged 2½ diameters. The darkest parts are tubes seen in section; the paler tubes are not cut into, but are seen through the transparent test.

Fig. 3. Transverse section of a branch of *C. gilchristi*, enlarged 2½ diameters.

Fig. 4. Polypide of *C. gilchristi*, ventral view, enlarged about 45 diameters. *b.* and *b.*, buds; *b.s.*, dark edge of the buccal shield; *ga.*, bulging of the side of the body caused by the stomach; *go.*, bulging of the side of the body caused by the gonad; *pl.*, plumes; *p.s.*, posterior lobe of the buccal shield; *r.l.*, red line of the buccal shield; *st.*, stolon.

Figs. 5 and 6. Two buds, of about the same age, showing the extremes of the positions in which the posterior lobe of the buccal shield may be found. *a.* and *p.*, anterior and posterior lobes of the buccal shield; *b.*, "body" of the bud; *s.*, stalk.

(Figs. 1–3 were drawn by Miss G. M. Woodward.)

PLATE 3.

Fig. 7. End view of a branch of *C. gilchristi* showing the relation of spines to ostia. Enlarged 4½ diameters. At *a* and at *b* there is one spine between two ostia; each of the other six ostia has a spine of its own.

Fig. 8. Transverse section of one of the solid cross-bars that connect up the branches of the tubarium. Enlarged 6 diameters. *a*, *b*, *c*, *d*, sections of spines buried in the common test.

Figs. 9, 10 and 11. Terminal portions of branches, to show the relation of the spines to the tubes. The spines are all represented as cut short. The irregular line in the lower part of figs. 9 and 10 marks where the piece of tubarium figured was torn away from the rest of the branch. In fig. 11 the torn surface, bounded by the line *k*, is directed obliquely towards the observer. The figures are enlarged 8 or 9 diameters. For explanation of the letters see text.

Butterworth, photo et sculp.

CEPHALODISCUS GILCHRISTI.

(*Nat. Size.*)

G.M.W. & W.G.R. del.

Huth London.

CEPHALODISCUS GILCHRISTI.

7.

8.

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TO

FISHES, MOLLUSCA, PLANKTON, ECHINODERMA.

(For Crustacea vide p. 121.)

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